A STUDY OF FOODS

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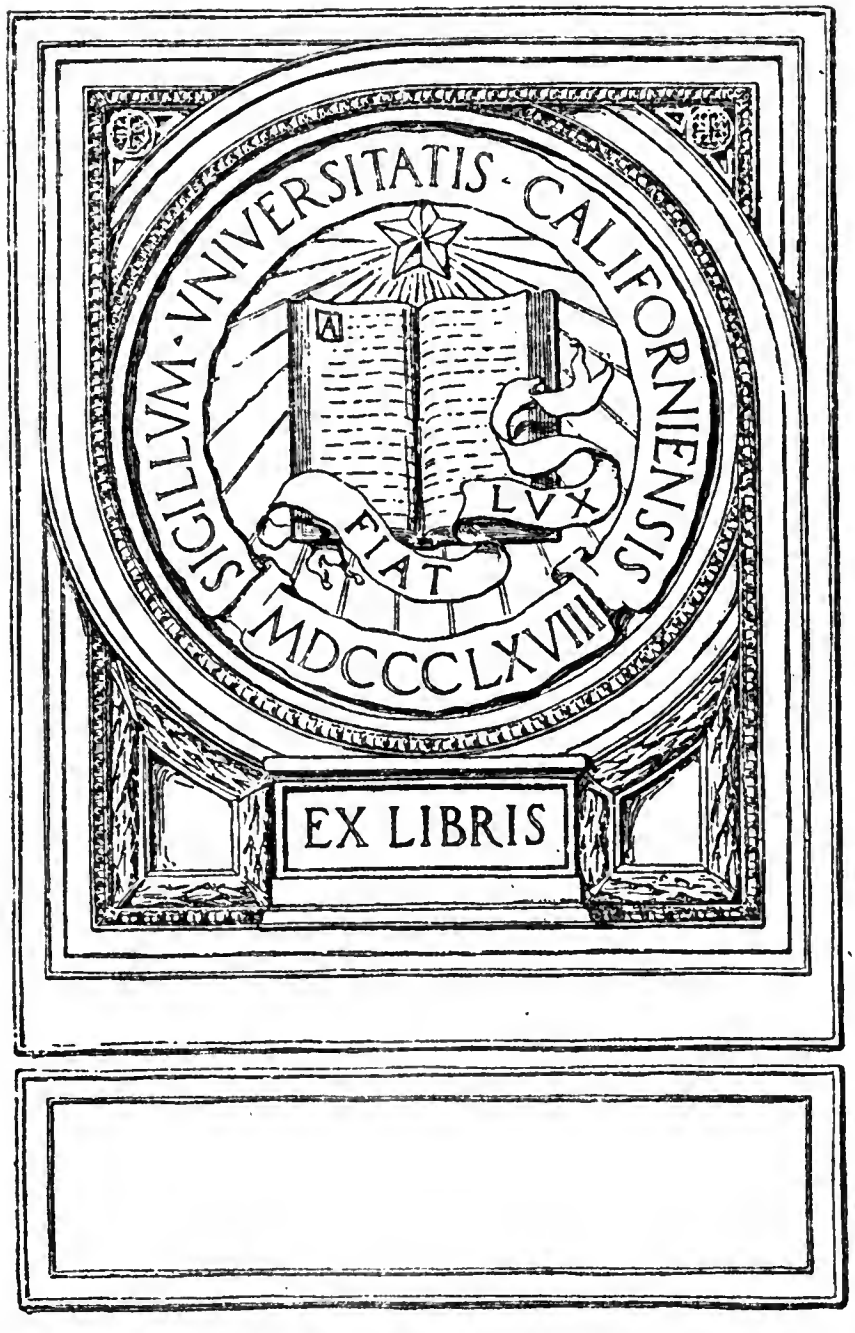
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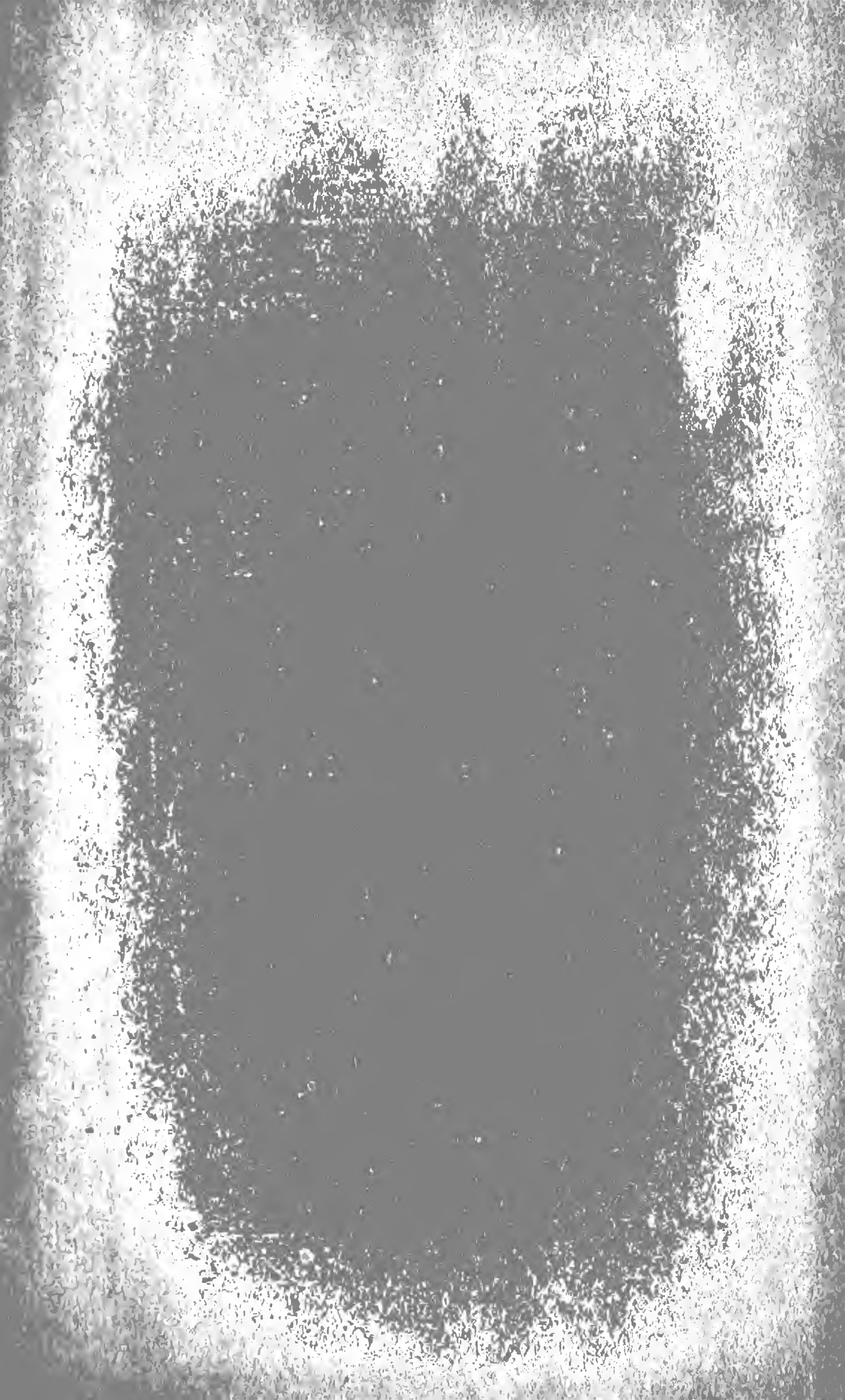

A School Kitchen

The picture shows detail of the stove supplied for each desk. The stove is designed by R. C. Kaiser, Ohio State University

A STUDY OF FOODS

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PREFACE

This volume is intended to present the subject of foods in a simple, concise manner. The preparation of food which is suggested in the book is in every case an illustration of some one or more principles involved and previously discussed. The object of this work is not to provide training for a finished cook, for skill comes only with experience and practice; neither is there an attempt to make a food expert. A serious consideration of the subjects of chemistry, the physiology of digestion, and dietetics belongs to a university course. It is hoped that the work outlined will give some knowledge of food materials, of the effects of heat upon them, of methods of manipulation, and of comparative cost of commercial and domestic products. The increased cost of living makes especially desirable a study of food values and the cost of food from different sources.

In schools where courses in chemistry, physiology, and physics are offered, there are many opportunities for correlation with the food work, which will at once suggest themselves to the well-trained teacher. The reference lists at the close of each chapter will be found very helpful for classes, as well as for clubs who use this book as a guide. The preparation of food suggested in the text could easily be managed in the home and results discussed and compared later.

The food principles, or nutrients, form the basis of the arrangement of the work, but the cost of food is especially emphasized. No attempt has been made to divide the work into separate lessons, and the subject matter may be amplified or abbreviated, according to the need. Suggested lists for reference are given, and it is hoped that these will be liberally used, for there has been no attempt to make this a complete text; it is intended only as a guide to the study of the subject of foods. Questions and exercises are frequently suggested for the use of the pupil, and these should be recorded in the notebook.

Grateful acknowledgment should be made to Professor Henry C. Sherman for suggestions and assistance and to Mr. A. D. Emmett and L. D. Hall of the Illinois Agricultural Experiment Station for the use of the photographs of meat and the descriptive matter accompanying them.

RUTH A. WARDALL
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A STUDY OF FOODS

CHAPTER I

FOOD

Food, as defined in *Farmers' Bulletin No. 142*, "is that which, taken into the body, builds tissue or yields energy." While the supply of building material and energy are two important functions, there is a third purpose served by food in the regulation of certain important processes in the body. Sherman says: "Upon the presence of the so-called inorganic elements also depend such important matters as the alkalinity or neutrality and coagulability of the blood, the acidity or alkalinity of the digestive juices, the solvent power and osmotic pressure of the body fluids, the elasticity and irritability of muscle and nerve. They also tend to protect the body against harmful substances by combining with them to form compounds which are less toxic or more readily eliminated. These latter functions are perhaps regulatory rather than structural and are hardly suggested by the term 'tissue building.'" In order to give them proper prominence it may be necessary to expand the usual definition of the function of food (that it yields energy and builds tissue) into one of three divisions according to which the functions of food are

1. To yield energy.
2. To furnish building material.
3. To regulate body processes.

The energy of the food furnishes power for internal work, as in respiration, digestion, and other body processes, as well as for external work, — when the muscles are brought into activity, — as in running, digging, or any other form of exercise. When the energy of the food is changed into energy for body use, heat is given off in somewhat the same way that heat results when the energy of the coal is changed into energy for the engine. Under ordinary conditions the heat resulting from energy transformation keeps the body at a comfortable temperature, but where a great deal of energy is needed, as in a brisk walk or in active muscular work, the amount of heat is greater and frequently causes discomfort. In case of little or no exercise and a cold day, it may be necessary to transform energy for the sake of keeping the body warm. Building material must be available to the body, for there is constant wear and tear of tissues in all, and development of tissue — or growth — in the young.

While foods present a great variety in appearance and flavor, it is found on chemical analysis that they are made up of compounds which may be divided into five general groups: water, mineral matter, protein, fat, and carbohydrate. All five of these nutrients are found in some foods; usually one or two are present in much greater quantity than the others, so that we value some foods for protein, some for fat, carbohydrate, or mineral content. Eggs and meat are valued especially for protein; butter and nuts, for fat; potatoes and rice, for carbohydrate in the form of starch. Flour is valued for carbohydrate and protein; green vegetables and fresh fruits, for water and mineral

matter; cheese, for fat and protein; and milk is unique in that it contains all the nutrients, or food principles.

Our foods are derived from both the plant and animal kingdoms. All the nutrients are abundant in either kingdom, with the exception of the carbohydrates, which occur mainly in plant foods.

Protein, mineral matter, and water are frequently classed as tissue builders. Water and mineral matter are found in all the body tissues, and protein is found principally in muscular and glandular tissues. Mineral matter, in addition to its function of building tissue, plays an important rôle in the regulation of body processes, as before stated. Fats and carbohydrates yield energy, and, to a considerable extent, one may take the place of the other for this purpose. While protein is the only one of the nutrients which can build certain body tissues, it may also serve the function of an energy yielder.

The same chemical elements which are found in the body are found in the food which is necessary to growth and maintenance of life. The wise selection of food is based upon a consideration of its composition, its ease and completeness of digestion, its cost, and palatability.

Carbohydrates

The carbohydrates consist of a group of substances closely related chemically, although differing in appearance and taste. The well-known carbohydrates are sugars, starches, and cellulose. The carbohydrates are found in the plant kingdom with very few exceptions, such as lactose in milk and glycogen in the body. Starch occurs more abundantly in vegetables than in fruits, and sugar

is found in both. A woody substance, cellulose, forms the framework of the plant. Cellulose is a food for the lower animals, but not for man; however, it is commonly eaten by man, and because of its bulk it is an aid in digestion. Starch and sugar are both valuable human foods; they do not build the tissues of the body, but they furnish energy. Since plant foods are less expensive than animal foods, the carbohydrates are generally less expensive than proteins and fats.

Fats

There are many substances chemically related which are known as fats. Those which are liquids at ordinary temperatures are called oils. Fats, like carbohydrates, yield energy and are frequently stored in considerable quantity in the body. Weight for weight, the fats yield two and a quarter times the energy that carbohydrates or proteins do. Fats are highly concentrated foods and are obtained from both plant and animal sources. The common animal sources are cream, butter, and fat of meat, and the common vegetable fats are olive oil, cottonseed oil, and the fat of nuts. Fat from most sources is expensive. We use fats not only as food but also as a medium for cooking.

Proteins

The term "protein" includes a group of substances chemically related, and all containing nitrogen, although not all substances containing nitrogen are proteins.

The chemistry of the proteins is very difficult and will not be discussed here. Some of the well-known members of the protein family are gluten of wheat, albumen of egg and meat, casein of milk, legumin of peas and beans.

Protein is derived from both plant and animal sources. Some plant foods rich in protein are wheat, corn, oats, peas, beans, peanuts, lentils, and nuts. The animal sources of proteins are meat, milk, eggs, and cheese. Plant foods are cheaper than animal foods, and consequently they are a cheaper source of protein.

Protein, like fat and carbohydrate, may serve as a source of energy to the body, but it differs from these in that it also builds tissue.

Although protein is very necessary in the diet, it should not be eaten in too great quantities, for certain ills may attend its excessive use. Heavy eating, and particularly heavy eating of meat, may easily furnish more protein than is desirable, and it is believed that meat protein may cause more harm than other proteins.

Water

Water furnishes the fluid necessary for the body and enters into the composition of all the tissues. Approximately two thirds of the weight of the body is water, consequently the supply must be liberal. All foods contain water; fruits, green vegetables, and milk are especially high in water content, but the body needs more than occurs in the food, and water should be freely used as a beverage.

Mineral Matter

The body contains several pounds of mineral matter, the bulk of which is in the bones and teeth. Some mineral salts are in solution in the body fluids, and some are found in other body tissues. Mineral matter occurs in practically all our foods, both animal and plant, but it varies in amount

and kind. While a freely chosen, normal diet may contain enough mineral matter to supply the demands of the body, it is not always in the form or amounts needed. Knowledge of the composition of food leads physicians to prescribe certain diets for people who show a lack of some mineral constituent. Fruit and vegetables are especially valued for their mineral content. The outer coats of the cereal grains, so often discarded, are also rich in mineral matter. Care is necessary, especially with children, to provide foods supplying mineral matter.

Preparation of Food

Some foods are eaten in the natural (or raw) state, but much of our food is cooked. Cooking means the application of heat to food. It makes it more attractive in appearance, more palatable, and destroys any living organisms which may be present. In the case of foods eaten in the raw state, such as lettuce, celery, and fruits, very thorough cleansing is necessary. One should be accurately informed as to the condition of milk which is used in the raw state, for it frequently is the carrier of disease germs. Methods of cooking and degree of heat vary with the nature of the food. The temperature and method of cooking should vary as fat, protein, or carbohydrate predominates in the food.

LABORATORY EXERCISES

I. *Laboratory and Equipment*

Examine desks, list equipment, and carefully note arrangement of utensils in the desk. If general supply cupboards are used by pupils, examine and note contents.

The following abbreviations are used throughout the book:

c	cup
s.s	salt-spoon
t	teaspoon
T	tablespoon

II. *Measurements*

Compressible materials, such as flour and powdered sugar, should be sifted before measuring, and lightly filled into the measure without packing. Heap all dry materials into the measuring cup or spoon, and level with the edge of a knife. Measure a half spoonful by dividing lengthwise. A measure of liquid means all that the cup or spoon will hold.

1. Answer the following questions by measuring with sugar; with flour; with water:

How many t in 1 T?
How many T in 1 c?
How many c in 1 lb.?
How many c in 1 pt.?

2. Repeat measurements for a check. Compare results with others in class and account for differences. Is the measure responsible in all cases?

III. *Weights*

1. Determine, by avoirdupois system, weight of

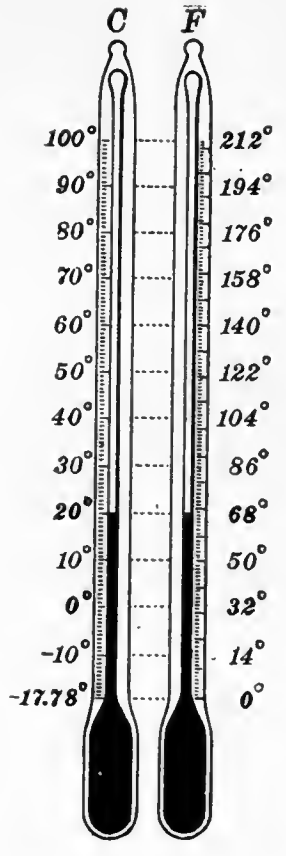
1 c flour
1 c sugar
1 c water
1 c lard

2. Compare weight of 1 c of unsifted flour with 1 c of flour sifted once, twice, and three times.

3. Compute weights of the above in the metric system.

NOTE. 1 pound = 453.6 grams; 1 ounce = 28.36 grams.

4. From above data compute number of cups of flour, sugar, water, and lard in 1 lb. avoirdupois.



THE CENTIGRADE AND FAHRENHEIT SCALES

TEMPERATURES

Heat is always used in cooking food, but it may be applied in a number of different ways. Varying degrees of heat may be employed in the cooking of food by using hot or boiling water, steam, hot fat, or hot air in the oven.

THERMOMETER SCALES

The difference between freezing and boiling temperatures is marked by 100 degrees on the centigrade scale and by 180 degrees on the Fahrenheit scale. The ratio between the two scales is 100 : 180, or 5 : 9. The freezing point is 0°C. and 32°F. To change from one scale to the other use the following formulas :

$$\frac{9}{5}\,C + 32 = F, \qquad \frac{5}{9}\,(F - 32) = C.$$

DEMONSTRATION BY TEACHER

A. High Temperatures

1. Note and record room temperature by centigrade thermometer.

2. Note and record boiling point of water.

3. Note and record temperature of steam just above boiling water.

4. Note and record temperature of steam in a covered kettle.

5. Note and record temperature of water in the covered top of a double boiler when the water below is boiling.

6. Oven temperatures.

By noting time required to brown white paper, test the oven at the following temperatures: 150°; 200°; 250°.

7. Fat temperatures.

a. Note condition of a piece of bread one minute after it is dropped into fat which is at the temperature of boiling water.

b. Note temperature of fat in which bread is browned: in one minute; in forty seconds.

B. Low Temperatures

Low temperatures are used in the household for preservation of food and in the preparation of frozen dishes.

1. What is the temperature of ice?
2. What is the temperature of a mixture of ice and salt?
3. Does the proportion of ice to salt affect the temperature of the mixture?

Fuels

The usual source of heat for cooking is furnished by coal, wood, gas, gasoline, and kerosene. Electricity is a very desirable, but usually a very expensive, source. The cost of fuel must be considered a part of the cost of our food, and should be added to the cost of raw food materials. By planning, it is possible to economize in our use of these fuels. For example, when the oven of a coal or wood range is in use, the top of the stove is hot and may also be in use; and a gas burner need not be turned on full in order to keep water boiling. If a gas meter is attached to a range, it will be observed that there is quite a difference in the gas consumed when the burner is partially opened and when it is turned on to the fullest extent.

GENERAL EXERCISES

Convert recorded temperatures to Fahrenheit scale.

What is the lowest temperature in the above demonstration?

When would you use this in cooking?

When would you use the highest temperature in cooking?

Suggest different dishes which might be prepared at the other temperatures.

What ways of applying heat to food are suggested in the above demonstrations? Which medium is most commonly used?

What is the source of heat used in preparation of food in a fireless cooker? In what way does the modern fireless cooker differ from the old "hay-box"? Is the hay-box or fireless cooker of any service in keeping things cool? Is a fireless cooker an aid to economy in fuel?

Suggest other ways of reducing cost of fuel in preparing food.

From the data and experience that you have, discuss the various fuels from the viewpoint of cost, desirability, and convenience.

Examine and operate all stoves and other heating devices found in the laboratory.

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CHAPTER II

WATER

Generally speaking, water is either hard or soft, depending on the mineral substances which it carries in solution. Rain water as stored in the ordinary cistern is the softest water available to the household. Well, river, and spring water vary greatly in the materials in solution, and consequently vary greatly in degree of hardness.

Boiling will sometimes bring about changes which tend to soften water. Doubtless all have observed the lime deposit in the teakettle. Other causes of hardness can be removed only by the use of chemicals. Cities sometimes use chemicals on a large scale to soften water for use. In a small way the same thing is done in the household when baking soda is added to the water for cooking beans, or lye is added to water which is to be used in cleaning.

While hardness of water is a matter of importance to the household, there is another far more important consideration. A *safe* water is one which does not contain disease germs or any substances injurious to health. A number of diseases are carried by water ; typhoid fever and dysentery are among the common ones. The appearance of typhoid fever should lead to an immediate investigation of water and milk supply. The typhoid fever record of a city is a fair index of the safety of its water. Water may be clear and sparkling and yet be very dangerous. Surface wells are very easily contaminated and there is always risk

in using water from such wells. Deep, driven wells are less liable to contamination, but their safety is not assured. Generally speaking, a municipal water supply is preferable to the ordinary well, because it is apt to be more carefully watched. The surety of a safe water supply is a moral obligation which all should feel. If there is any doubt about it, the water should be boiled. The household filters ordinarily seen are worse than useless, and often a real menace because they frequently become breeding places for germs. Directions from a board of health to boil water should never be neglected.

As said before, a liberal supply of water is needed for the body fluids and to remove waste. Water is used as a beverage, either alone or flavored with other substances. It is used also as an agent in the preparation of food. Hot water is a very common medium for the cooking of food, and in tea, lemonade, and other mixtures, water serves as a carrier of flavor.

LABORATORY EXERCISES

Water as a Medium for Foods and Flavors

I. *Lemonade*

1 lemon	3 T sugar
1 c cold water	½ c boiling water

Wash lemon and grate a small portion of yellow rind. Add boiling water to sugar and grated rind. To this add cold water and juice of lemon. Chill and serve.

II. *Fruit Punch*

1 c cold water	1½ T lemon juice
¼–½ c sugar	¼ c chopped pineapple
¼ c orange juice	

Boil water, sugar, and pineapple several minutes; cool, add fruit juice, strain, and dilute with ice water.

Other fruit juices could be substituted for any of these.

Lemon juice is necessary with almost any fruit.

III. *Lemon Ice*

2 c sugar
1 c boiling water
1 c lemon juice
3 c cold water

Make a sirup of sugar and hot water. Add the rest of the water and then the fruit juices.

For variation add ½ t vanilla, juice of an orange, or other fruit juice. Freeze.

IV. *Sherbet*

To 1 qt. of lemon or other ice add the beaten white of 1 egg, when the mixture begins to freeze.

V. *Tea*

1 c freshly boiling water
1 t tea

Scald the teapot. Pour water over the tea in the teapot. Let tea stand 2 or 3 minutes in a hot place, and serve. Never boil tea.

Compare the beverages made from green tea, from black tea, and from a mixture of the two.

VI. *Coffee*

1. 1 c freshly boiling water
   2 T ground coffee mixed with 1 T cold water

Pour boiling water over the moistened coffee in the coffeepot. Boil up once, simmer 4 or 5 minutes, and let stand in a hot place for from 5 to 10 minutes.

2. 1 c cold water
   2 T ground coffee

Pour water over coffee in the coffeepot. Bring to boiling point, and then simmer for 2 minutes. Stand in a hot place for from 5 to 10 minutes.

A small amount of white of egg may be stirred in after the coffee has boiled, to aid in settling the grounds. Long cooking of coffee not only impairs the fine flavor but extracts undesirable substances.

Compare the beverages made from coffees of different kinds and grades as to desirability and cost.

GENERAL EXERCISES

Calculate the cost of a cup of black coffee; the cost of a cup of coffee with sugar and cream.

Determine source of home and of school water supply.

Is lemonade a valuable food? Explain.

Calculate the cost of a glass of lemonade.

Why use freshly boiling water for tea and coffee?

Are tea and coffee valuable as foods?

Are there any objections to their use?

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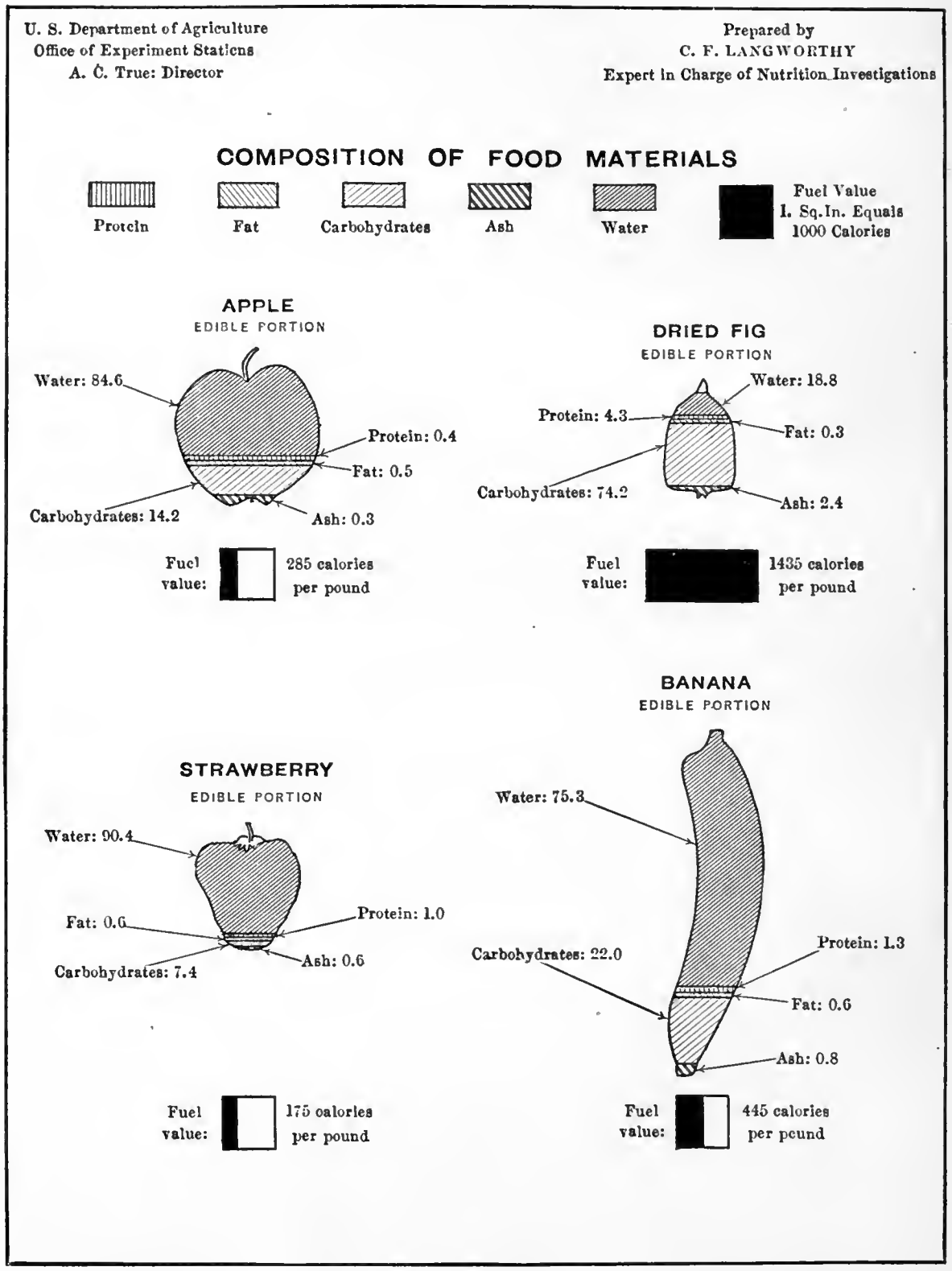
CHAPTER III

FRUITS AND GREEN VEGETABLES

Fruits

Fruits are largely composed of water. Many of the fresh fruits contain from 80 to 90 per cent of water. Dates, figs, and raisins are fruits from which the water has been evaporated, and consequently they are concentrated foods. Peaches, apricots, apples, and prunes are dried in order to preserve them, but the water is restored when they are prepared for eating, and they resemble other cooked fruits in composition. The banana owes its food value largely to the starch it contains, while a number of fruits, especially grapes and pineapples, are valued for sugar. The acids and minerals occurring in fruits give them an important place in the diet. The woody fiber which forms the framework of the fruit is a carbohydrate called cellulose, which adds bulk to the food and stimulates peristalsis.

Fruit is frequently valued as an appetizer, and the water content and bulk make it a desirable addition to the diet, although for actual nutrients fruits are expensive. Canned fruit has a greater food value due to the addition of sugar. The cooking of fruit changes the flavor, cooks starch if present, softens the cellulose, and in the case of dried fruits restores the water lost. It is important that the juice be served with the cooked fruit so that the mineral salts may not be lost.



FRESH AND DRIED FRUITS

Green Vegetables

Various parts of plants are used as food. The stem of asparagus, leaves of the spinach, flower of the cauliflower, root of the beet, fruit of beans and tomatoes, are eaten. Many green vegetables are grown and valued for their variety in flavor, their bulk, and their mineral salts. Green vegetables, like fruits, are conspicuously high in water; lettuce, cucumbers, and celery, for example, are about 95 per cent water. Cellulose forms the framework of the green vegetables. Minerals occur in all, sugar and starch in some. In cooking strong-juiced vegetables, such as onions and cabbage, a large amount of water is used; and in vegetables valued for sugar and other soluble materials, as corn, peas, carrots, etc., it is best to use the smallest amount of water that is possible.

LABORATORY EXERCISES

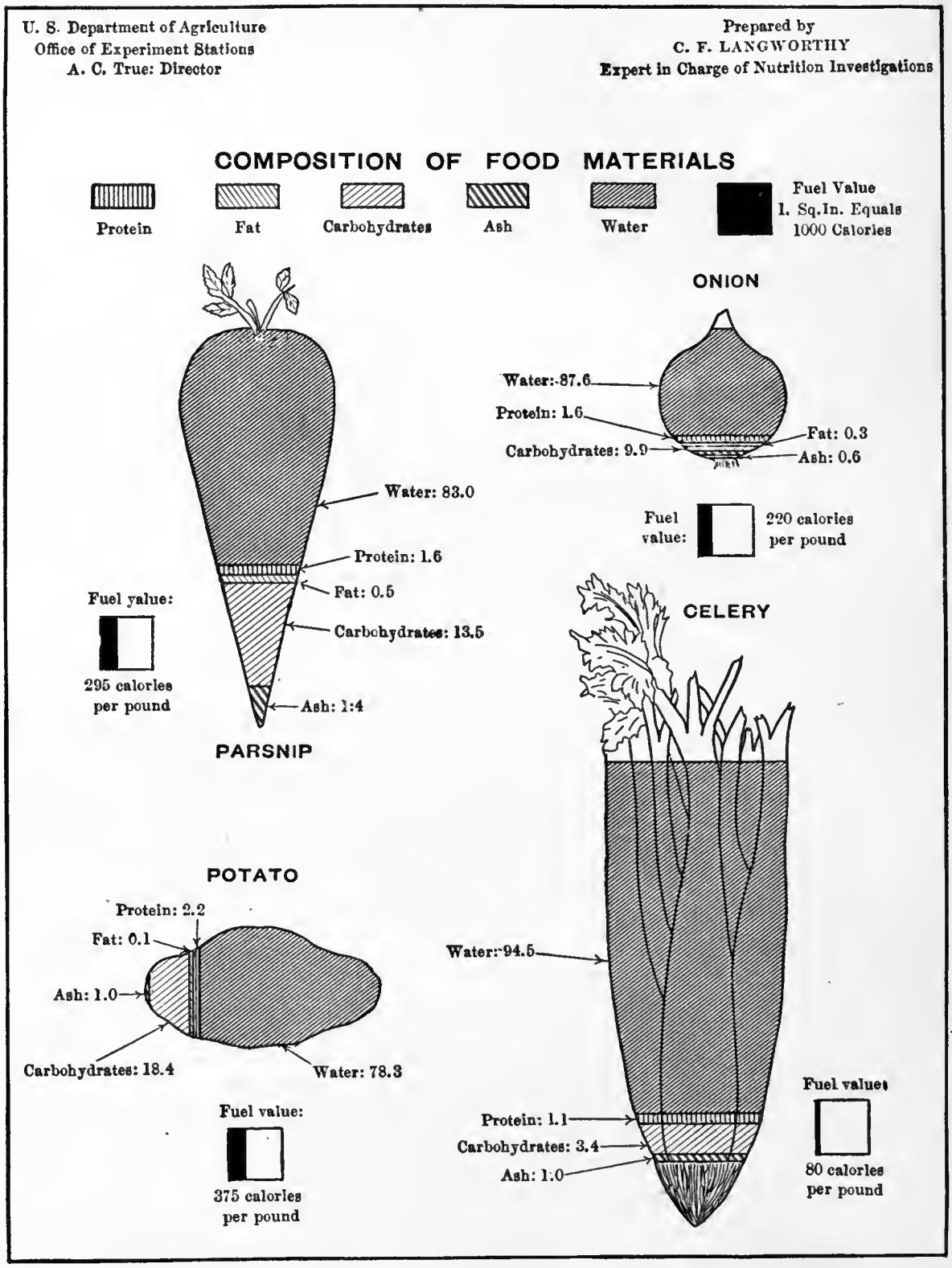
I. *Canned Green Vegetables*

Open the can and empty at once. The flavor is usually improved by allowing the vegetables to stand for an hour or more exposed to the air.

The majority of the canned green vegetables are palatable when simply seasoned with butter, pepper, and salt, and heated; or they may be served with cream sauce.

II. *Baked Apples*

Select sound apples, preferably tart ones. Wash and core, place in a shallow pan, fill centers with sugar, or a mixture of sugar and cinnamon, cover the bottom of the pan with water. Bake in a moderate oven until apples are easily pierced with a fork. If the oven is very hot, cover with a pan or baste apples frequently with the sirup in bottom of pan.



ROOTS AND SUCCULENT VEGETABLES

III. *Stewed Prunes*

Select good prunes, sort, and wash. Cover with water and soak several hours or overnight; then slowly cook in the same water until plump and smooth and the stones will easily slip out. A little lemon juice or sugar may be added.

IV. *Creamed Onions*

Cook onions in a large amount of boiling water in an uncovered kettle, and change water two or three times. Cook until tender; drain, and reheat in white sauce.

V. *Escaloped Cabbage*

Cook cabbage in boiling, salted water, changing water two or three times; do not overcook. Arrange in baking dish alternate layers of cabbage and cream sauce. Cover with buttered crumbs and brown in oven.

VI. *Glazed Sweet Potatoes*

Wash and pare potatoes. Cook until partially done in boiling water. Remove from water, cut potatoes in halves or slices. Brush with melted butter, sprinkle with sugar lightly, and bake. Or make a sirup of 1 T sugar, 1 T water, and 1 T butter; brush potatoes with this, and baste with it during the cooking.

VII. *Spinach*

Carefully pick over and wash spinach through several waters. Cover bottom of pan with water, place spinach in pan, heat slowly, and cook until tender. Drain, season with butter, salt, and pepper, and garnish with slices of hard-cooked egg.

Salads

A salad is a wholesome and a favorite way of serving vegetables, both fresh and cooked. Combinations of meat, eggs, fruit, nuts, and cheese with vegetables are frequently made in salads.

The dressing is usually a mixture of vinegar, egg, fat, and seasonings. The simplest of all dressings (the French dressing) is made of oil, vinegar, and seasonings, and is not cooked; a raw egg in combination with the same gives a mayonnaise. Butter is more commonly used than oil in making dressings, and the mixture is cooked.

As a source of food the salads vary greatly, depending entirely upon the materials put into them. If properly used, the salads are a very desirable addition to the diet. With a heavy meal a light salad, such as celery or lettuce, should be chosen, and in this case the salad is an accessory to the meal. The salad if made of meat, egg, or cheese may really be the major part of the meal.

Care should be taken to have vegetables or fruits fresh, crisp, and thoroughly cleaned, and meat carefully freed from gristle and bone. All materials, including dressing, should be cold. Salads should be carefully mixed and served, in order to preserve their attractiveness.

LABORATORY EXERCISES

I. *French Salad Dressing*

3 T oil	1 T vinegar or lemon juice
$\frac{1}{4}$ t salt	$\frac{1}{8}$ t paprika

Mix salt and pepper with oil, add vinegar slowly, and beat.

II. *Cream Dressing*

Yolks 3 eggs or 2 whole eggs	1 t salt
2 T flour	1 t mustard
1 T sugar	$\frac{1}{2}$ c vinegar
1 T butter	Paprika

Mix dry ingredients, add vinegar, and cook thoroughly; remove from fire, add slightly beaten egg and butter. Cool, and

store in a glass jar until ready for use. When ready to serve, thin the dressing with cream, sweet or sour. Whipped cream is especially desirable.

III. *Vegetable Salad*

½ c peas	1 small cucumber
½ c string beans	1 tomato

Carefully prepare the vegetables and serve with either French or cream dressing.

IV. *Fruit Salad*

Use seasonable fruits, either alone or in combination. Serve on lettuce leaf with French or cream dressing.

GENERAL EXERCISES

From *Bulletin No. 28*, "Chemical Composition of American Food Materials," and *Farmers' Bulletin No. 293*, "Use of Fruit as Food," list ten commonly used fruits according to water content; according to sugar content. Which are valued for food and which as appetizers? Compare grapes and raisins with respect to water and sugar content, and explain difference.

List ten common green vegetables according to water content; protein content. What green vegetables contain sugar?

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CHAPTER IV

PRESERVATION OF FRUIT AND VEGETABLES

Food spoils, due to the action of some form of plant or animal growth. The most common causes of spoiling are the minute plants, always found in the air, called bacteria, yeasts,

Apparatus for steaming Fruit in Cans

and molds. A food, or any other substance, is sterile when all these microscopic forms of life have been killed. Sterilization is most frequently accomplished by the use of heat.

Since all dust is laden with these minute forms, food should not be exposed to the air unnecessarily. Like other

plants, these microscopic forms need food, warmth, and moisture. One of the means of protecting food is to keep it in a dry place, and in some cases the food is actually dried, as raisins and dried apples. Cold is the commonest and best means of protecting food, either in the household refrigerator or the commercial cold-storage plant.

Heat, sugar, salt, vinegar, spices, and certain chemicals are used in preserving food for long periods of time. These agents are useful because they do not favor animal and plant growth. Heat is the most effective preservative, for if high enough and long enough applied, it will kill any form of life. Sugar, vinegar, and spices give a desired flavor to the food, as well as aid in preserving it, if used in sufficient quantities. Frequently several of these agents are combined. Canning powders may preserve food indefinitely, but they should never be used. The Pure Food Laws are forbidding the use of chemicals by the manufacturer, and the housewife should be no less particular. Heat, if properly used, will preserve food as well as chemicals, and there can be no question as to the safety of its use.

The preservation of food has largely passed out of the modern household, excepting the canning and pickling processes, and, in some localities, the curing of meat.

LABORATORY EXERCISES

Agents and Methods of Preservation[1]

Experiment I. Put portions of some ripe fruit (as peach or apple) and vegetables (as tomato) on small dishes and treat as indicated:

1. Expose at room temperature.
2. Place in refrigerator.

[1] This group of experiments may be demonstrated.

3. Carefully dry sample in slow oven. Leave exposed in room.
4. Cover with ground spice.
5. Cover with sugar.
6. Cover with salt.

Examine samples at intervals and note results.

Experiment II. Prepare duplicate samples for comparison.

1. (*a*) Put slices of raw fruit into small glass bottles; cover with water; cork and seal.

(*b*) Repeat with cooked fruit.

2. Sterilize, by boiling, two small glass bottles with corks to fit.

(*a*) Fill one with raw fruit; cover with water; cork and seal.

(*b*) Fill the other with cooked fruit at boiling temperature; cork and seal.

Examine samples at intervals and compare.

Experiment III. Put slices of fruit in small glass bottles and treat as indicated:

1. Cover with alcohol.
2. Cover with vinegar.
3. Cover with sirup of 5 T sugar and 2 T water.

Examine at intervals and compare.

All samples in these experiments should be discarded on spoiling, but some will need to be kept for a long period.

In Experiment I note order in which samples spoil. Why do some keep indefinitely?

Discuss the value of sterilization as illustrated in Experiment II. What is complete sterilization, and in which sample is this illustrated?

Compare samples in Experiment III. Are all desirable? Explain.

When would you use any of the above methods in the household?

Canning

Canning is largely a method of preservation by heat. In the canning of fruit, usually from one fourth to one third the weight of the fruit in sugar is added to give the desired flavor.

Cans, lids, and rubbers should be thoroughly washed and rinsed. Cans and lids should be sterilized by boiling, and care should be taken not to touch the top of the can or the inside of the lid with fingers or cloth. New rubbers

Types of Fruit Jars

only should be used, and these should be sterilized with boiling water. Spoons and funnels used in handling fruit should be sterilized in boiling water.

LABORATORY EXERCISES

I. *Canned Corn*

Use only fresh and perfect corn. Free from silk and cut from cob, using care not to cut too closely. Put into kettle, barely cover with water, and boil thoroughly. Fill jars, add 1 t salt and 1 t sugar, and set lids loosely on top. Place in a covered steamer, steam 1 hour, and seal. After 24 hours fill steamer with cold water and heat, steaming the corn for an hour. Repeat the

steaming the third day. This same method is applicable to beans, peas, and other vegetables.

Calculate cost, and note on each jar.

II. *Canned Peaches*

Prepare peaches by paring and dividing into halves. Make a sirup, using 1 c sugar to 2 c water. Cook peaches in sirup until tender and somewhat transparent, put into sterilized jars, and

I II

I. Jar of Fancy Melba Peaches; cost, $1. II. Fifteen Jars of Peaches canned in Laboratory; cost, $1

seal. Invert jars at once and leave until cool. By inverting the jar an ill-fitting top is quickly discovered. This same general method is applicable to other fruits.

Keep a complete record of cost of fruit and sugar used for each jar. Note on a gummed label, and paste on jar together with date and name.

III. *Canned Tomatoes*

Sterilize cans, tops, and rubbers as for canned fruit. Wash tomatoes, scald, remove skins and hard green core. Cut into

quarters and cook, without adding water, until thoroughly heated through and boiling. Fill jars, seal, and invert.

Calculate and note cost on each jar.

Preserving

Preserving fruit is largely a method of preservation by a heavy sugar solution, three fourths to equal weight of sugar being used.

Wash, rinse, and scald with boiling water the glasses for preserves. Cover fruit with melted paraffin.

LABORATORY EXERCISE

I. *Grape Conserve*

1 pint grapes	¾ c raisins
1 small orange	

Pulp grapes, cook until soft; then put through a colander and add skins, orange pulp, and raisins. To every cup of this add a cup of sugar and cook until of desired consistency. Nuts added at this time increase the attractiveness of the conserve.

Calculate and record cost on each glass.

Jelly-making

In making jelly, sugar is used in large enough quantity to act as a preservative.

Prepare glasses as for preserves and cover in same way.

LABORATORY EXERCISE

I. *Grape Jelly*

Cover the bottom of an enameled kettle with water and add the grapes, which have been thoroughly washed. Cover, cook slowly, and stir occasionally. When simmering point is reached, crush the fruit with a masher and continue heating until thoroughly cooked. Pour the hot mass into a double square of

cheesecloth; tie the corners together and let the juice run out. Do not squeeze the pulp. Measure the juice, boil 2 or 3 minutes, add a three-fourths measure of sugar, and boil until the jelly will drop in flakes from the spoon. Pour into hot jelly glasses and cover with melted paraffin.

The same method may be used with any juicy fruit.

Calculate and record cost on each glass.

Pickling

Pickling is usually a method of preserving by use of vinegar and spices. Heat may or may not be used.

Wash, rinse, and scald jars.

LABORATORY EXERCISE

I. *Cucumber Pickles*

Place cucumbers in stone jar, cover with brine in proportion of $\frac{1}{2}$c salt to 2 qt. boiling water. Let stand 24 hours. Drain off brine, scald, and pour again over cucumbers. Let stand until cool, or longer if necessary. Drain off the brine and pack pickles closely in jars.

1 pint vinegar	Stick cinnamon
Salt	Sugar
Cloves	Pepper

Scald vinegar with seasonings, pour over pickles, and seal jars. These seasonings vary with strength of vinegar, spices, and individual tastes.

Calculate and record cost of pickles on each jar.

GENERAL EXERCISES

In order to test the proper care of all sorts of canned materials, carefully wrap and stand in a dark place samples of each kind of fruit and vegetable canned. Leave duplicate samples exposed to full

light. After two or three months open and compare the above samples with each other, and with commercial samples.

Carefully measure commercial products to estimate the cost of one quart, and compare with the domestic product made in the class.

COMPARISON OF DOMESTIC AND COMMERCIAL PRODUCTS

PRODUCT EXAMINED	FLAVOR	APPEARANCE	COST PER QUART		REMARKS (Suggest reasons for differences)
			IN SEASON	AT TIME OF CANNING	
Corn					
Commercial { Cheap / Expensive					
Domestic Product					
Tomatoes					
Commercial { Cheap / Expensive					
Domestic Product					
Peaches					
Commercial { Cheap / Expensive					
Domestic Product					
Jelly					
Commercial { Cheap / Expensive					
Domestic Product					
Pickles (Cucumber)					
Commercial { Bottled / Bulk					
Domestic Product					

1 bu. peaches = 48 lb. 1 bu. tomatoes = 56 lb.

What is a reasonable price to pay for peaches for canning? for tomatoes?

What factors enter into the cost of the commercial product, which are not usually counted in the domestic product?

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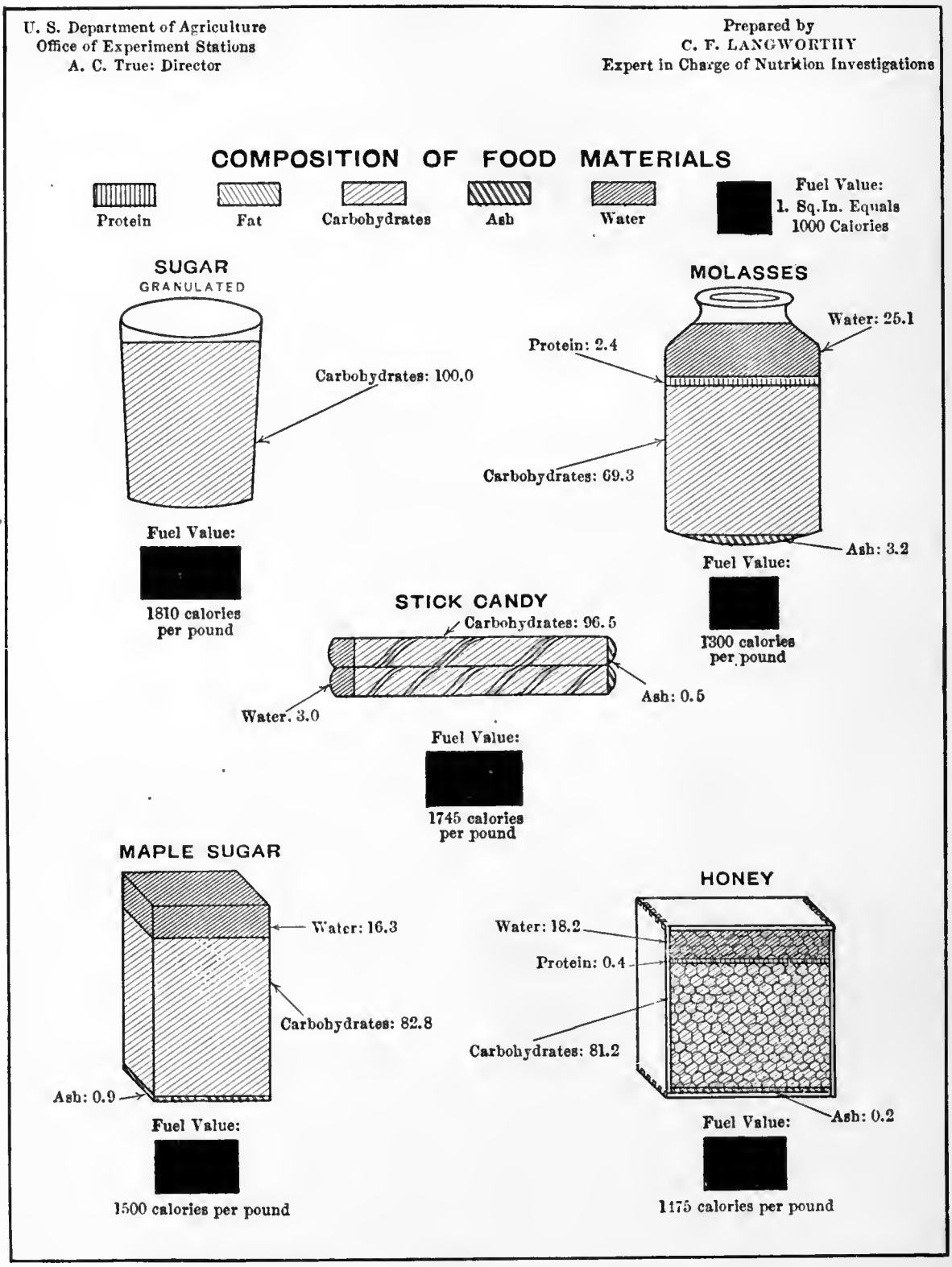
CHAPTER V

SUGAR

There are several kinds of sugars. The common commercial sugars are granulated, powdered, light and dark brown, maple, and glucose. The commercial names do not indicate their chemical composition — chemically pure powdered, granulated, and maple sugars are identical. Commercial maple sugar contains flavoring materials which make it very desirable for some purposes. There are a number of chemically different sugars, which are of interest to the physiologist, but in the household we are principally concerned with granulated (cane) sugar and grape sugar (dextrose).

Granulated sugar is obtained commercially from the sugar cane and the sugar beet. Contrary to popular notions, the sugar is the same from both sources. Differences which have been noted in granulated sugars are probably due to the degree of purification in their manufacture. Cane sugar is found in fruits and other vegetables, but in lesser quantities than in the sugar cane and beet. Grape sugar occurs in honey, fresh and dried fruits, and may be seen in small whitish lumps on raisins and prunes. The starches and sugars are easily changed to grape sugar by the action of heat and acid outside the body and by digestive fluids in the body.

The commercial sirup (glucose or corn sirup) is prepared from starch, and contains from 34 to 36 per cent of grape sugar. When cream of tartar, vinegar, or lemon juice is



SUGAR AND SIMILAR FOODS

added to taffy,a portion of the cane sugar is changed to grape sugar. Cane sugar easily granulates, while grape sugar does not; so in the making of candy it is desirable to have glucose, to prevent the coarse granulation, or "turning to sugar."

The sugars are valuable as food. They are easily dissolved, do not require cooking, give a pleasant flavor to other foods, and, eaten in moderation, are valuable to the body as a source of energy. The sweet flavor of sugar is universally liked, and frequently it is used in too great quantities, particularly in the form of candy, and with tea, coffee, and cereals. The overeating of sugar may cause fermentation in the stomach.

Cane sugar is the form most commonly used, but the grape sugar is eaten in large quantities in honey, corn sirups, candy, and fruits. Grape sugar is wholesome as a food, and occurs in the body as a result of the digestion of starches and sugars. Glucose is produced more cheaply than cane sugar, and the chief objection to its use in commercially prepared food is its substitution for the more expensive products without a reduction in the price of the finished article. Glucose is more familiar to us in the form of sirup than as a dry sugar, and is not so sweet as cane sugar. Under the Pure Food Laws, the sirup glucose is called corn sirup — a concession to the popular prejudice against glucose.

Lactose (milk sugar) is prepared commercially and is frequently used in infants' food. Lactose is still less sweet than grape sugar. Molasses is another familiar form of sugar in the household. It contains both cane sugar and grape sugar and a number of coloring and flavoring substances which exist in the raw materials from which the sugar is made.

LABORATORY EXERCISES

I. *Effect of Heat upon Cane Sugar*[1]

1. Put $\frac{1}{4}$ c sugar in a small frying pan, heat gently, and stir constantly until sugar is melted. Quickly remove a small portion to a plate and examine the product, which is known as barley sugar. Continue the heating until the whole mass is light brown in color. Remove a small portion of this product (caramel) to a plate and compare with barley sugar. To the caramel in pan add $\frac{1}{4}$ c boiling water and boil to a sirup. This caramel may be saved and used for flavoring custards and sauces.

2. To 1 c sugar add $\frac{1}{2}$ c water. Place in a small pan. Boil, and with constant use of the thermometer discover the temperature for the following tests which are in constant use:

a. When sirup will form a soft ball in cold water.
b. When sirup will form a thread as it is dropped from spoon.
c. When sirup will form a hard ball in cold water.
d. When sirup will harden in cold water and crack on cooling (crack stage).
e. When caramel is formed.

Remove a portion to a small dish at each stage of the heating. Compare products and suggest uses.

II. *Peanut Brittle*

Place $\frac{1}{2}$ c sugar in small frying pan, heat slowly, stirring constantly, until sugar is melted and light brown in color. Stir in 2 T chopped peanuts and pour at once onto a buttered plate.

III. *Fondant*

Add $\frac{1}{2}$ c sugar to $\frac{1}{3}$ c hot water, stir until dissolved, then add $\frac{1}{16}$ t cream of tartar and boil to soft ball stage. During cooking remove all crystals from the sides of the pan by washing

[1] This may be demonstrated by the teacher.

with a wet cloth wrapped around a fork. Pour onto a cold plate, cool, flavor, then beat with a spoon until it stiffens and can be molded with the hands. Handle the mass until it is soft and creamy. This may be molded into candies at once or it may be covered closely and allowed to stand for 24 hours.

IV. *Chocolate Creams*

Mold fondant into desired shapes, and when firm place on tip of fork and dip into the melted chocolate.

Grate or scrape chocolate into a cup or bowl and place the bowl in warm, not hot, water. Be very careful not to overheat or the chocolate will thicken.

Place dipped creams on oiled paper and cool at once.

V. *Molasses Taffy*

⅓c molasses	1 c sugar
1 T butter	⅓c boiling water
1 T vinegar	⅛t soda
½t vanilla	

Mix all the ingredients except the soda and cook until brittle when tried in cold water. Add soda and pour onto a buttered pan. When cool enough to handle, add vanilla and pull candy until light. Pull out into a long rope and cut with scissors.

VI. *Butterscotch*

1 c sugar	Flavoring
⅓c water	⅛t cream of tartar
1 T butter	

Boil together sugar, water, and cream of tartar until the color changes to a light brown. Remove from fire, stir in butter and flavoring. Boil up again and pour, in a very thin layer, onto a buttered pan. Mark into squares before the candy hardens.

GENERAL EXERCISES

Comparison of Commercial and Domestic Products

	Appearance	Cost	Flavor	Remarks
Peanut Brittle				
Commercial				
Domestic				
Chocolate Creams				
Commercial				
Domestic				
Butterscotch				
Commercial				
Domestic				
Taffy				
Commercial				
Domestic				

Why is cream of tartar added to fondant? Is this absolutely necessary? Why is the flavoring not added at the beginning of the cooking process? What are the objections to cheap candies?

Table sirup made from granulated sugar in the household frequently turns to sugar on standing. Can you suggest any way to avoid this? Illustrate with an example.

Examine the samples of different sugars and note characteristics.

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CHAPTER VI

STARCH

Starch is the form in which plants commonly store food. Starch occurs in the form of grains, which are closely packed in the plant cell. These grains vary in different plants, and microscopic examination of the starch grain usually tells at once the kind of plant from which it comes. Corn is the common commercial source of starch, both for laundry and for table use. Starch is also prepared from wheat and potatoes. Less usual forms of starch are tapioca, sago, and arrowroot.

Starch is a valuable food and a cheaper form of carbohydrate than sugar. Its use in the body is the same as that of sugar; it yields energy for work and keeps the body warm. In the process of digestion starch is made soluble, finally being reduced to grape sugar, in which form it circulates through the animal body. Carbohydrate may be stored in very small quantities in animals and exists in the form of glycogen, sometimes called animal starch. Dry starch when heated changes its color and flavor and is converted into a form of carbohydrate called dextrin. This substance is familiar in toast and in browned flour used in making gravy. Starch, unlike sugar, is not soluble in cold water. Starch heated with water swells, changes its flavor and appearance, thickens, and forms a translucent mass. Raw or undercooked starch has an unpleasant flavor, so

all starchy food should be thoroughly cooked and should reach the boiling point some time during the cooking process. The thickening power of starch makes it desirable in the preparation of many dishes, such as puddings, sauces, and gravies. It is necessary to use a little care in cooking starch to avoid lumping. Starch, if first mixed with something else, as sugar, cold water, or fat, does not lump when a hot liquid is stirred into it. When iodine is added to starch, it turns blue. This is a simple and reliable test for detecting starch.

LABORATORY EXERCISES

I. *Cornstarch Pudding*

$\frac{1}{2}$ c fruit juice	$\frac{3}{4}$ c water
2 or 3 cloves	Sugar to taste
$\frac{1}{8}$ t salt	2 T cornstarch

Heat water and juice. When boiling, stir in the cornstarch which has been mixed with a little cold water. Stir over the direct flame until it thickens, and add cloves and sugar. Cook $\frac{1}{2}$ hour in a double boiler; then pour into molds to cool. Fruit or nuts may be added at this time.

Chill and serve plain with fruit or with cream.

Strong flavored fruits, as plums or grapes, should be used.

Calculate number of servings and cost.

II. *White Sauce*

1 c milk	2 T flour
2 T butter	Salt and pepper

Soften or melt butter in pan, add flour, and mix thoroughly. Remove pan from fire and very gradually add the milk, stirring constantly to avoid formation of lumps. After these are mixed, return to fire and boil the sauce thoroughly. Add pepper and salt.

III. *Cream Toast*

Prepare two slices of toast, and dip each into hot white sauce. Place on a heated plate and pour the remainder of the sauce over them.

GENERAL EXERCISES

Test several foods for starch.

Make a microscopic examination of starches from different sources.

Is there any difference in the thickening power of white and browned or dextrinized flour? Explain.

Compare value of cornstarch and flour as thickening agents. Explain.

Will cost lead to a choice between them?

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CHAPTER VII

POTATOES

The potato is a commonly used vegetable. It is a tuber, or underground stem, in which the plant stores a large amount of starch, and so is a good source of food. New potatoes, if ripe, are more palatable than old potatoes. When potatoes are old and begin to sprout, they become waxy on cooking and are not so choice. This is due to a certain change in composition. The potato is composed of water (75 per cent), cellulose, starch, mineral salts, and a small amount of protein. We value the potato for its starch and the bulkiness of its cellulose. The mineral salts lie very close to the skin, and a thick peeling may easily remove a large part. Care should be taken not to overcook potatoes. They are mealy if properly cooked, but soggy if overcooked or not thoroughly drained and dried.

LABORATORY EXERCISES

I. Cut a very thin slice through the center of a potato, hold up to the light, and observe the structure. Add a drop of weak iodine solution and observe again.

II. Remove skin from a potato and grate about one third of the potato. Let this stand two or three minutes on a plate which is placed on a slant. What is the bulky portion? Pour liquid off from the lower edge. What remains?

III. Boil one potato with the skin on, and one potato which has been pared. After the water used in cooking the two potatoes has been cooled, test it with iodine.

Compare the two potatoes as to appearance and flavor.

IV. Prepare two potatoes of uniform size for baking. Put one into the oven 20 minutes after the other. Remove both when second potato is properly cooked.

Compare the properly cooked and the overcooked potato. Why are you often directed to pierce skin of baked potato when it is done?

V. *Boiled Potatoes*

Select potatoes of uniform size. Clean and pare, or not, as desired. Cook in boiling, salted water until easily pierced with a fork. Drain off water and shake the pan over the fire until potatoes are thoroughly dried.

VI. *Creamed Potatoes*

Use diced boiled potatoes. Prepare a white sauce of the desired consistency, and add salt and pepper. Turn the potatoes into this, and with as little stirring as possible heat potatoes thoroughly.

VII. *Mashed Potatoes*

2 boiled potatoes	Salt
Milk or cream	Butter

Potatoes for mashing should be pared before cooking. Mash potatoes, and add butter and salt. Mix thoroughly and add milk, beating vigorously. Pile lightly in a hot dish and serve.

Why is the amount of milk and seasoning not given in this direction?

VIII. *Potatoes au Gratin*

Put a layer of diced, cold boiled potatoes in a baking dish. Sprinkle with grated cheese and diced pimentos. Cover with

white sauce. Repeat until dish is full. Cover with buttered crumbs and bake until well browned.

Buttered crumbs. Melt 1 T butter in pan, add 4 or 5 T bread crumbs, and mix thoroughly.

IX. *Escaloped Potatoes*

Put alternate layers of sliced, hard-cooked eggs and cold, boiled potatoes in a greased baking dish. Cover each layer with white sauce. Put buttered crumbs on top and bake until brown.

X. *Potato Salad*

Use only potatoes which have been thoroughly cooled after cooking.

1 c diced potatoes	1 hard-cooked egg
$\frac{1}{4}$ c diced celery	Dressing

The flavor of the salad may be changed by adding a little onion, pimento, or green pepper. A potato salad should be carefully and lightly mixed, and not stirred and mashed together with a spoon. Enough dressing should be used to coat and flavor the whole salad. It is better if it stands at least half an hour. Serve on a crisp lettuce leaf.

GENERAL EXERCISES

For a family of six compare the cost of a dish of boiled potatoes when they cost 90 cents a bushel and when they cost $2.50 a bushel.

What would be the cost of a dish of boiled rice, hominy, or mush for the same family?

Is one of these a reasonable substitute for one of the others?

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CHAPTER VIII

CEREALS AND CEREAL PRODUCTS

The cereals, and the preparations from them, furnish foods high in starch. Some fruits and vegetables contain starch, but in smaller proportions. The potato, a very starchy vegetable, is considered in the preceding chapter.

The cereals — wheat, oats, corn, rice, barley, rye, millet, and buckwheat — store a large amount of starch in their seeds. In some cases these seeds, or grains, are used whole, and in others they are crushed, rolled, or ground into meal or flour. In addition to starch, which averages 65 per cent to 70 per cent, the cereals contain 10 per cent to 12 per cent each of protein and water, and, with the exception of oats and corn, very little fat. The mineral matter in cereals adds greatly to their food value. In milling the grains, the outer layers and germs of the grain are frequently discarded and so the greater part of the ash is lost. The loss of total mineral matter in milling may be shown in the case of wheat; the whole grain contains 2 per cent ash, the bran about 6 per cent, and the white flour about $\frac{1}{2}$ per cent.

A list of the so-called breakfast cereals found on the market will quickly reveal the fact that there is a large number of commercial products made from this group of foods. When the cereals are put up in fancy boxes and under special names there is an increase in the price not always warranted.

From corn, starch is prepared on a commercial scale and sold as cornstarch. Corn meal is a staple article of food, and hominy is another familiar preparation from corn. Wheat in the form of flour for bread and cake is very extensively used. Macaroni and spaghetti are pastes made of coarsely ground wheat (called semolina) and water.

While the cereals are high in starch, which is desirable for its nutritive value, they also contain the bulky cellulose,

TEN CENTS' WORTH OF EIGHT WELL-KNOWN BREAKFAST FOODS

1, Grape Nuts; 2, Puffed Rice; 3, Shredded Wheat Biscuit; 4, Corn Flakes; 5, Cream of Wheat; 6, Rice; 7, Oatmeal; 8, Corn Meal

which serves its purpose in the body by aiding in peristalsis. In cooking cereals, starch and cellulose are to be specially considered. For the sake of flavor starch should be thoroughly cooked, reaching the boiling point at some time during the process. The cellulose, surrounding the starchy grains, must be softened so that the digestive juices may more easily penetrate the mass. The greater the amount of cellulose and the larger the particles of the grain, the longer must the cooking be continued. Cracked or rolled

oats, for instance, are more quickly cooked than the whole grain. Rice contains less cellulose along with the starch; consequently it is more quickly cooked.

The cereals form a large part of the food of people in the greater part of the world. They are easily grown and stored, and being high in all the nutrients but fat, they furnish one of the cheapest sources of food. The corn of the American Indian and the oatmeal of the Scotch Highlander furnish a much more complete food than the rice of the oriental, due to the fact that rice furnishes practically no protein or fat. The rice-eating people use fish and beans to supply fat and protein in their diet. The common custom of using butter with bread, eggs and milk with rice is easily justified on the ground of composition of wheat and rice.

LABORATORY EXERCISES

I. *Boiled Rice*

1. ¼ c rice — 2 c boiling water
   ½ t salt

Wash rice and add to 2 c rapidly boiling water in which ½ t salt has been dissolved. Keep up the rapid boiling until the rice is tender, replacing the water lost by evaporation, if needed. Turn water and rice into a strainer, drain, and set in the oven to dry slightly.

Note time of cooking; bulk before and after cooking.

Continue boiling the water in which rice was cooked until its volume is reduced about one half. Explain.

2. ¼ c rice — ⅔ c boiling water
   ¼ t salt

Wash rice, add to boiling salted water, and cook 3 or 4 minutes. Finish cooking in a double boiler and avoid stirring the rice. Compare with rice from No. 1, as to appearance and flavor.

Note time of cooking; bulk before and after cooking.

When would you use these different methods, and why?

II. *Escaloped Rice*

Put a layer of cooked rice in a buttered baking dish; cover with a layer of grated cheese and white sauce. Repeat until dish is filled. Cover with buttered crumbs and brown in oven.

Macaroni may be prepared in a similar way.

III. *Rice Pudding*

4 c milk
$\frac{1}{3}$ c rice
$\frac{1}{2}$ c seeded raisins, if desired
$\frac{1}{3}$ c sugar
$\frac{1}{2}$ t salt

Mix ingredients in a baking dish and cook in a very slow oven for from 4 to 5 hours. It will be necessary to stir occasionally to prevent rice and raisins from settling to bottom of dish. If raisins are not used, some flavoring should be added.

Calculate cost of this pudding, and the number of people it will serve.

IV. *Boiled Macaroni*

Macaroni
Salt
Boiling water

Break macaroni into inch lengths and cook in rapidly boiling salted water until tender. Drain.

V. *Macaroni with Tomato Sauce*

1 c tomato juice
2 T flour
2 T butter
$\frac{1}{4}$ t salt
$\frac{1}{16}$ t pepper
$\frac{1}{4}$–$\frac{1}{2}$ t sugar
1 slice onion

Melt butter; mix thoroughly with flour. Remove from fire; gradually add tomato juice, stirring constantly. Add seasonings. Boil sauce until it thickens and remove onion.

Place alternate layers of boiled macaroni and tomato sauce in a buttered baking dish. Cover top with buttered crumbs. Bake until the whole is heated through and crumbs are browned.

Rice may be prepared in a similar way.

Breakfast Cereals

In cereals the starch and cellulose are both improved by long cooking. A fireless cooker may well be used after the cereal has been thoroughly boiled. It is economical because it saves the time of watching and the fuel for cooking. An undercooked cereal is poor in flavor, and breakfast cereals are so frequently undercooked that many people do not care for them and will not eat them.

LABORATORY EXERCISES

I. *Corn Meal Mush*

1 c corn meal	3½ c boiling water
	1 t salt

Mix corn meal with cold water, slowly stir this into the rapidly boiling water, boil and stir for 5 minutes, cook more slowly for 2 to 3 hours. This may be served hot with milk or cream and sugar, or it may be molded and used for frying. It is nice to use milk in place of part of the water.

Note increase in bulk of corn meal after cooking.

II. *Fried Mush*

Cut molded mush into ⅜-inch slices. Drop into deep fat and cook until golden brown.

If desired, the slices may be dipped into egg and crumbs.

III. *Rolled Oats*

1 c Rolled Oats	2 c water
	½ t salt

Gradually stir oats into boiling salted water. Boil, stirring constantly, for 5 minutes, then cook at a lower heat for several hours.

Raisins or dates make a nice addition, but they should be cooked with the cereal.

Note increase in bulk on cooking.

GENERAL EXERCISES

In using corn meal for breakfast cereal, what measure would you cook for a family of six? Calculate cost.

What is the measure and cost for Quaker Oats and Cream of Wheat? How much would the addition of raisins or dates increase the cost and food value?

What is the amount and cost of Shredded Wheat and Corn Flakes needed for a family of six?

Compare package and bulk cereals as to cost and desirability.

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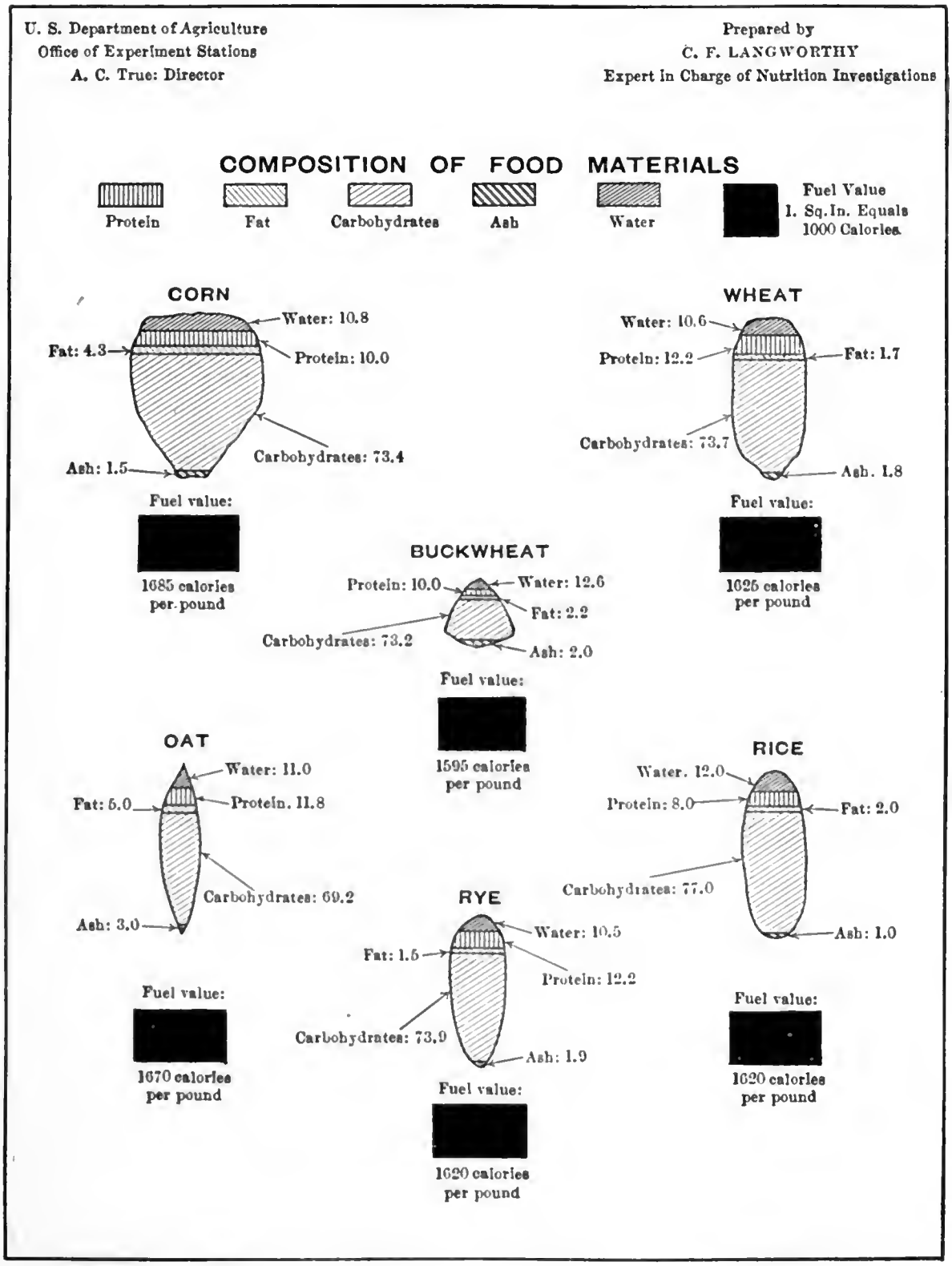
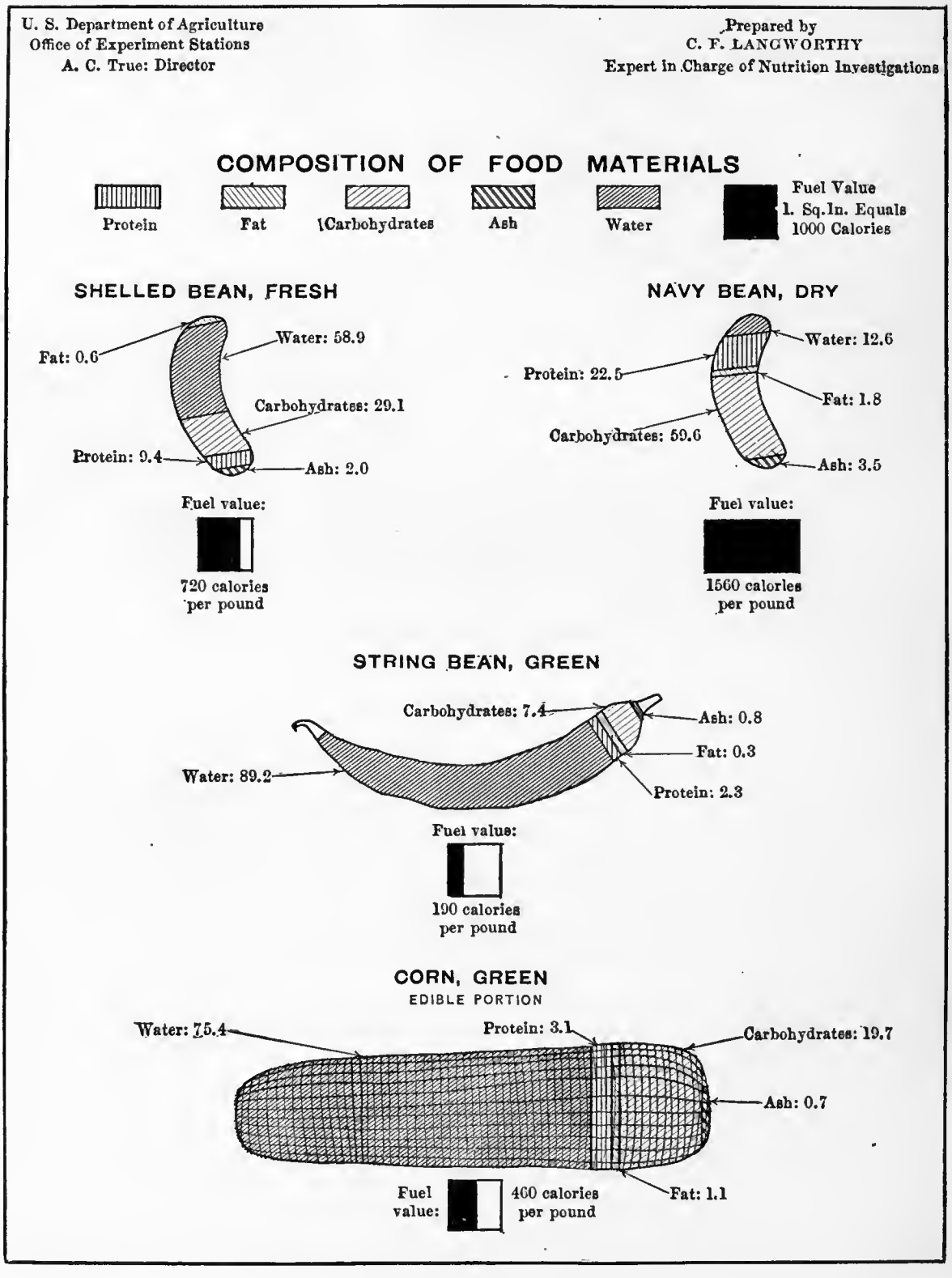


CEREAL GRAINS



LEGUMES AND CORN

CHAPTER IX

DRIED LEGUMES

Not many vegetables are dried, but legumes — such as beans, peas, lentils, and peanuts — are kept in the dry state for use during the whole year. These dried legumes, naturally, have a very low percentage of water. They are high in protein and contain some starch. Peanuts are high in fat. In some households corn is dried, and it makes a very acceptable product. Commercially, other vegetables have been dried, but the result is not altogether satisfactory.

The legumes are not only high in food value, but they are inexpensive, make a very good substitute for meat, and add variety to the diet. The wide use of legumes by certain races, and by those engaged in hard labor, such as lumbermen, bears evidence to the fact that their food value is high. A little care bestowed upon the preparation of the legumes will result in very palatable dishes, the use of which should be encouraged both from a dietetic and an economic viewpoint. The removal of the hulls of beans and peas will frequently prevent the discomfort which sometimes follows the eating of them. If the water used in cooking is very hard, a little soda should be added. Time should be allowed for soaking these dried foods, and they should be cooked until they are thoroughly softened.

LABORATORY EXERCISES

I. *Baked Beans*

Soak 4 c beans overnight in cold water. In the morning add fresh cold water and cook slowly until the skins begin to burst. Pour off water and put beans into jar. Bury in beans $\frac{3}{4}$ lb. of fat salt pork. To 1 c boiling water add 1 T salt, 1 T molasses, 3 T sugar, and pour over beans. Add enough more boiling water to cover beans; replenish, if needed, during cooking. Cover the bean jar and bake slowly from 6 to 8 hours. Mustard may be added if the flavor is desired.

Calculate the cost of this dish and the number of people served.

What is the increase in the bulk of beans on cooking?

II. *Lentil Soup*

4 c lentils	1 lb. ham	Salt
1 bay leaf	1 onion	Pepper
1 carrot	1 T butter	

Soak lentils overnight, drain, cover with cold water, and bring to boil; cook for an hour. Drain again, cover with boiling water, add $\frac{1}{4}$ t soda, ham, bay leaf, onion, and carrot. Cook until lentils are tender. Remove ham, press through a colander. Season with salt, pepper, and butter. Add cream or milk to give desired consistency.

III. *Dried-Pea Soup*

1 c dried peas	Small piece of	2 T flour
2 qt. cold water	fat salt pork	1 $\frac{1}{2}$ t salt
$\frac{1}{2}$ onion	3 T butter	$\frac{1}{8}$ t pepper

Soak peas several hours or overnight; drain, add water, pork, and onion. Simmer several hours until soft, and run through colander or sieve. Melt butter, add flour, and mix. Add to this a small portion of the soup, boil, and turn into the soup kettle. This use of flour and butter in the making of soup or gravy is

termed "binding," because it holds together all the ingredients of the dish. Season with salt and pepper. If soup is too thick, add milk or cream.

IV. *Cream of Lima Beans*

Soak 1 c dried beans overnight, drain, and cook slowly in salted water for from 2 to 3 hours. Drain, season with butter, pepper, and salt, and add ½ c cream.

V. *Peanut Sandwiches*

Put freshly roasted peanuts through the finest knife on the grinder; mix with melted butter or salad dressing and make into sandwiches.

VI. *Salted Peanuts*

½ T butter or olive oil ½ c shelled peanuts Salt

Shell and remove skins from unroasted peanuts, add them to the hot fat in frying pan, and stir constantly until peanuts are a light brown. Salt, and cool on brown paper to remove excess of fat.

GENERAL EXERCISES

Is it desirable to use the fireless cooker in preparing dried vegetables?

Compare the composition of beans and peanuts with potatoes.

Would you serve salted peanuts with a heavy or a light meal?

If you were going camping and were allowed small luggage, suggest some of the vegetable foods which you probably would take and some which you would not.

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CHAPTER X

MILK

Milk has a large percentage of water, but still contains enough of other nutrients to make it a good food. It is especially adapted to infants and young children, but is desirable for older people, either when taken alone or combined with other foods.

COMPOSITION OF MILK

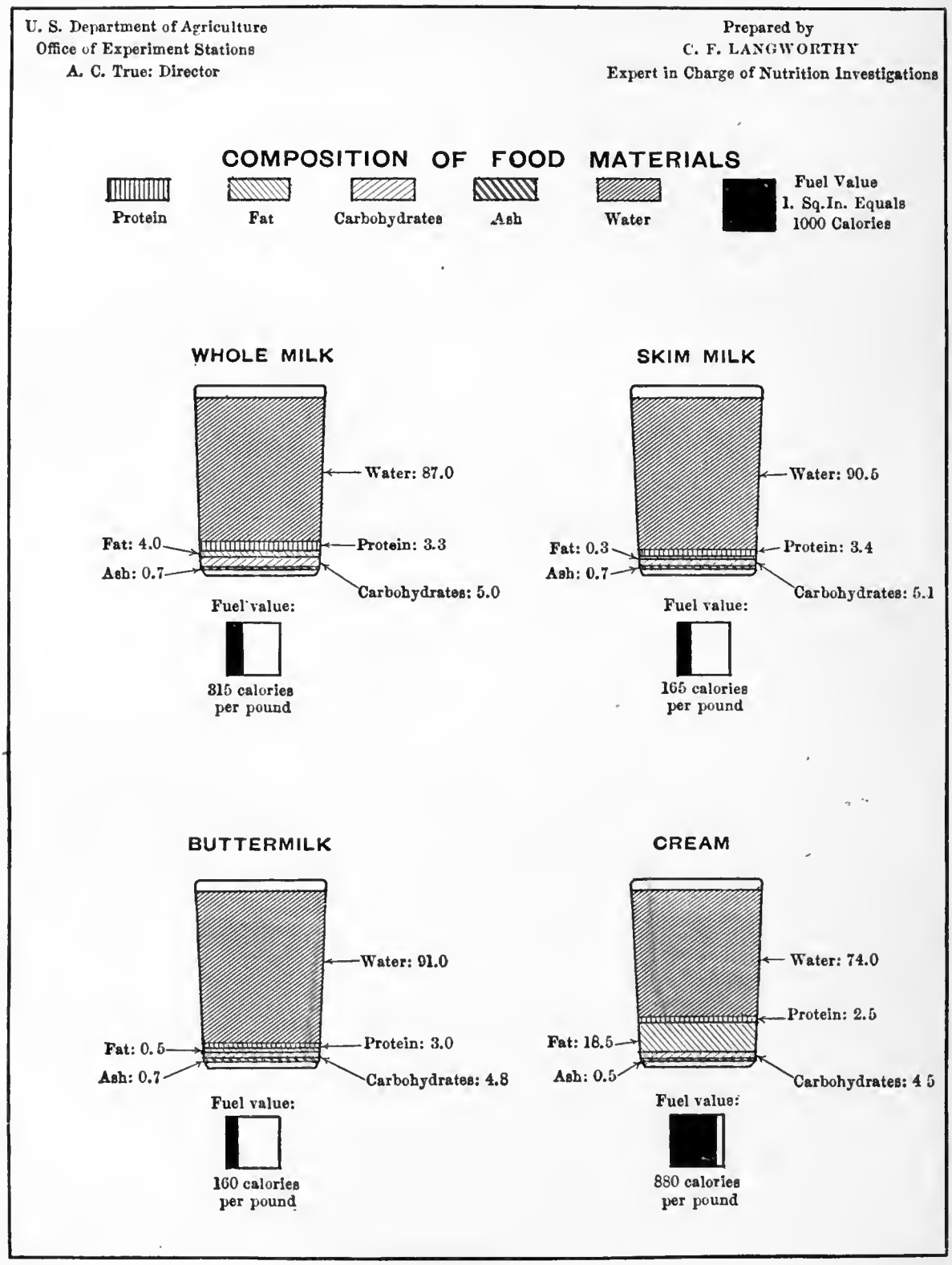
CONSTITUENTS	PER CENT
Water	87–88
Protein	3–4
Fat	3–5
Carbohydrate	4.5–5
Ash	0.7

It will be noted that milk contains the five nutrients, or food principles, and this is to be expected when it is realized that infants and growing children live on milk alone. It is adapted in form and composition to the needs of the young, but it is not good as an exclusive food for older persons, for the food principles are not in proper proportion for the adult.

Milk is an animal food which contains a carbohydrate. This is a sugar and is called lactose. The fat of milk occurs in tiny globules (which rise to the top of milk as cream), and is separated in the form of butter. The mineral

matter of milk is especially adapted to the needs of the growing child. The protein of milk is mainly in two forms, casein and albumen. As said before, protein is the nutrient which builds tissue, and this is absolutely necessary for people of all ages, but especially needed for the young on account of growth. If milk is taken with a meal instead of water, it must be remembered that so much extra food is being added to the meal. A glass of milk or a bowl of cream soup may well form part of a light lunch. The value of skimmed milk as a food is not always appreciated. Skimming removes fat only, and the rest of the nutrients are left. The price of skimmed milk is much less than that of whole milk, and it has enough food value to deserve more extended use.

Certain minute forms, already discussed in Chapter IV, as well as similar forms which produce disease, grow very readily in milk. Consequently great care must be used in producing, handling, and keeping milk. The production of clean, wholesome milk involves extra care and means additional expense. It is always wise to pay the price of good, wholesome milk, particularly if it is used for infants or invalids. The duty of inspecting dairies belongs to city boards of health ; and from these boards information concerning the condition of the milk from any dairy may be obtained. The duty of the householder is to know the source of the milk supply in the first place, and, in the second place, to take proper care of the milk after it is in the house. All pails, pans, bottles, and other vessels in which milk is kept should be thoroughly washed and scalded with boiling water after each use. A milk vessel rinsed with boiling water is in better condition if it is not wiped with



MILK AND MILK PRODUCTS

a towel or cloth, for these are not free from bacteria. For the same reason, the common custom of rinsing a pan in fresh cold water is not a good one. If the condition of the milk is doubtful, it is best to pasteurize or boil the milk, since heat will kill any disease-producing forms. Boiling milk will destroy many organisms present, but it affects the flavor of the milk and brings about other undesirable changes. In pasteurization the milk is not heated to the boiling point, but to a temperature high enough to destroy most disease-producing organisms.

LABORATORY EXERCISES[1]

I. *Pasteurization of Milk*

Nearly fill a clean bottle with fresh milk. Cork with a carefully rolled plug of clean cotton. Place the bottle in cold water, taking care that the water does not reach the mouth of the bottle. Heat slowly until the water reaches a temperature of 60° C. Remove from fire, but keep closely covered for 20 minutes. Remove from water and cool quickly. Keep in a cool place.

Why should pasteurized milk be used soon after treating?

II. *Effect of Boiling upon Milk*

1. Boil a portion of sweet milk for 1 minute. Cool and compare with pasteurized milk as to taste.

2. Boil a portion of sour milk for 1 minute.

III. *Separation of Constituents of Milk*

1. Skim cream from 1 c of milk. What has been removed from the milk?

2. To the skimmed milk add vinegar drop by drop until the white curd (casein) separates out from the liquid. Strain. What nutrient is strained out?

[1] Exercises I, II, and III may be demonstrated by the teacher.

3. Boil the liquid which has passed through the strainer in 2. Strain or filter this through a filter paper. On the filter paper is the albumen. What nutrient is this?

4. The liquid which has passed through the filter in 3 is the water of the milk with some substances dissolved in it. What are they?

IV. *Cottage Cheese*

Pour 2 c of hot, but not boiling, water over 2 c of thick, sour milk. Strain. If the curd has a sour taste, add water a second time. Season with salt, pepper, and cream.

V. *Junket*

Heat to lukewarm $\frac{1}{2}$ c milk. Add $\frac{1}{2}$ t sugar, a few drops vanilla, and $\frac{1}{8}$ junket tablet dissolved in 1 t warm water. Pour at once into a dish. When set, cool and serve.

VI. *Chocolate*

$\frac{2}{3}$ c heated milk
$\frac{1}{2}$ square bitter chocolate
$\frac{1}{2}$ t cornstarch mixed with $\frac{1}{3}$ c cold milk
$\frac{1}{2}$ T sugar
A few grains of salt
4 or 5 drops of vanilla

Add cornstarch, sugar, and salt to cold milk and heat to boiling, stirring constantly. Remove from fire, add grated chocolate, and mix with $\frac{2}{3}$ c heated milk. Heat in a double boiler from 10 to 15 minutes. Just before serving, add vanilla and beat with Dover egg-beater.

VII. *Potato Soup*

3 potatoes
4 c milk
2 slices onion
2 T butter
1 T flour
1 $\frac{1}{2}$ t salt
$\frac{1}{4}$ t celery salt
$\frac{1}{8}$ t pepper
A few grains of cayenne
1 T chopped parsley

Cook potatoes in boiling, salted water. When soft, rub through a sieve. Scald milk with onion until well seasoned, remove onion, and mix milk and potatoes. Bind the mixture with butter and flour which have been cooked together. Add seasonings and serve.

GENERAL EXERCISES

Compare cost of milk per quart from different dealers. What causes the difference in price? What is the standing of your milk dealer?

When should milk be pasteurized?

What changes do you observe when sweet milk is heated; when sour milk is heated?

Why not use boiling water in making cottage cheese?

Why do you heat milk in a double boiler?

Why not use *hot* milk in making junket?

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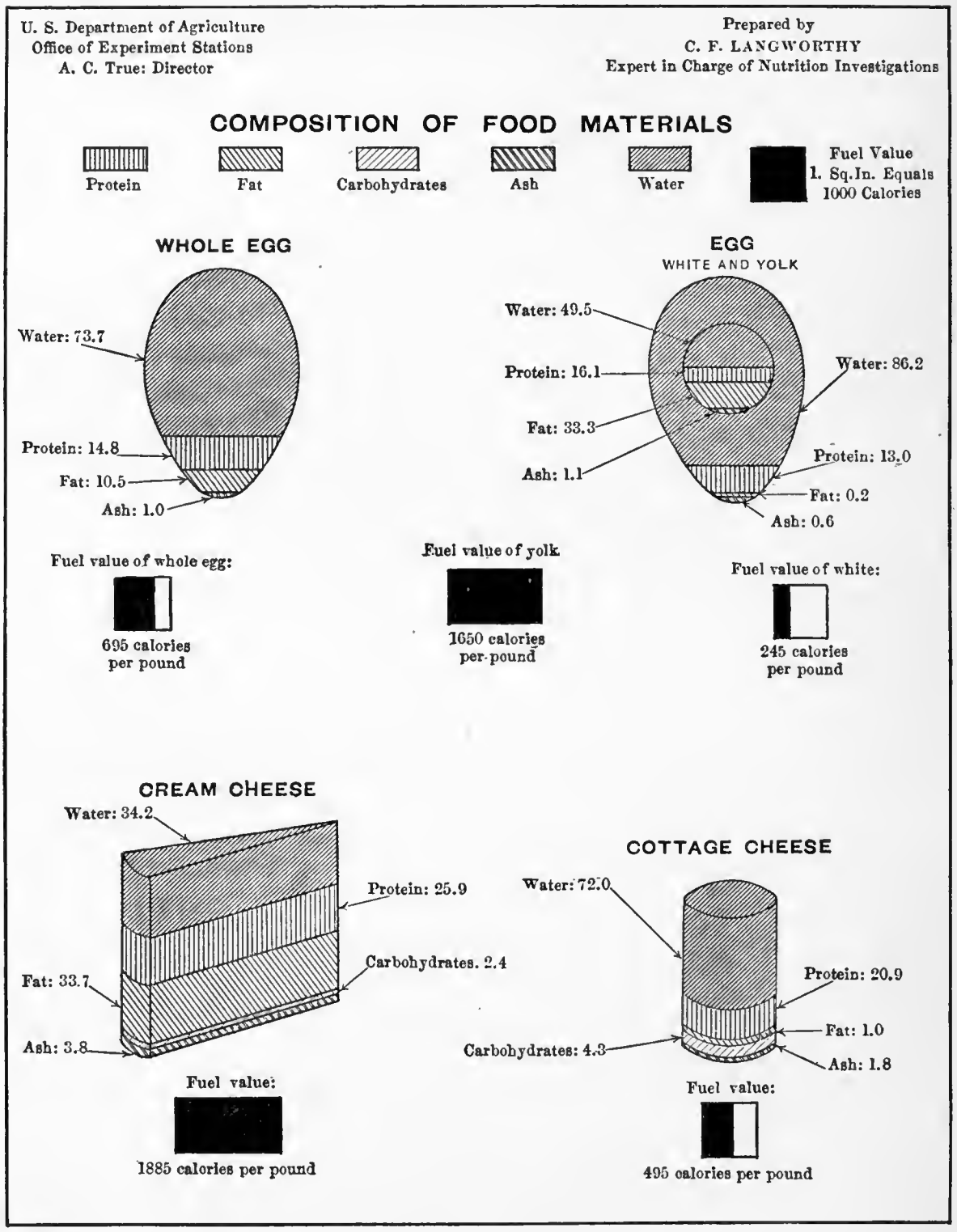

EGGS AND CHEESE

CHAPTER XI

EGGS

Eggs are a valuable animal food composed of water, protein, fat, and mineral matter, all the substances required for the development of the young chick. The percentage of water is less than in milk, the protein is greater, and there is no carbohydrate. Albumen is found in the white and yolk of egg, as well as in milk, but other forms of protein occur in eggs. The yolk contains the fat and a large part of the mineral matter. Eggs are a good substitute for meat because of their protein. The shell of the egg, contrary to popular notion, is porous, and consequently will permit the entrance of disease and other putrefactive germs. Dirty nests may be dangerous, and if eggs are packed, clean material should be used. Eggs should be kept clean rather than washed, for they have a slight covering which is some protection against infection as well as against evaporation. As an egg grows older, water evaporates through the porous shell and the egg weighs less. This fact is made use of in testing the freshness of eggs. When they are put into water or a salt solution, the fresh or heavy ones stay at the bottom and the lighter ones come to the top. The white of egg on beating entangles a large amount of air, and this is an aid in making light desserts, omelets, and cakes. Albumen coagulates on heating, and this makes egg a thickening agent for custards and sauces. Care must

be taken not to overcook albumen ; if in combination with a liquid, it will first thicken the liquid, but on continued heating it will separate, as the protein of milk does in making cottage cheese. If albumen is heated slightly it becomes jellylike, and on continued heating it grows very hard and tough.

LABORATORY EXERCISES[1]

I. *Manipulation.*

1. Separate the white and yolk of an egg. Beat each thoroughly with a wire egg-beater. Note difference in results. Let both stand 30 minutes. Observe occasionally, but do not disturb. If eggs are used as leaveners, when should they be beaten?

2. Beat whole egg thoroughly. Compare 1 and 2. What effect does the presence of the yolk have on the beating of the white? What is the purpose in the beating of eggs?

II. *Effect of Heat upon Eggs.*

1. Place 3 eggs in 3 pints of boiling water. Remove from flame, cover closely, and keep warm. Test 1 egg in 5 minutes, another in 7, and the third in 10.

2. Cover 1 egg with boiling water. Boil for 3 minutes. Remove and test.

3. Cover 1 egg with boiling water and boil for 20 minutes.

What factors would have any effect on comparable results in the above experiments?

III. *Poached Eggs.*

Place 1 c water in small frying pan. Bring to boil, add $\frac{1}{4}$ t salt. Break an egg into a saucer and carefully slip it into a buttered muffin ring placed in the bottom of the frying pan. The water should cover the egg. Place the pan where the water cannot

[1] Exercises I and II may be demonstrated by the teacher.

boil, let stand until a white film has formed over the top of the egg and the white is firm (about 6 minutes). With a skimmer remove the egg and muffin ring to a piece of buttered toast and carefully lift off the ring. Season with butter, salt, and pepper.

IV. *Omelet.*

1 egg	1 T water
$\frac{1}{8}$ t salt	Pepper
1 t butter	

Separate white and yolk of egg. Beat yolk until thick, add salt, pepper, and water, and mix well. Beat white until stiff but not dry. Fold the white carefully into the yolk. Melt the butter in an omelet pan, add the egg, and cook at a low temperature. Place in a hot oven to dry the top. Fold and turn onto a hot platter.

When should the oven be lighted?

When should the white of egg be beaten?

Would a preparation of yolks of eggs alone be light?

V. *Baked Custard.*

1 c milk	2 T sugar
1 egg	A few grains of salt
Flavoring	

Do not beat egg, but mix thoroughly with milk, sugar, and salt. Add milk and flavoring and pour into a custard cup. Set cup in a pan of warm water and place in oven.

Why is the cup set in a pan of water?

VI. *Soft Custard.*

1 c scalded milk	Few grains salt
1 egg	Vanilla
2 T sugar	

Beat egg slightly and add sugar and salt; stir constantly while gradually adding the hot milk. Cook in a double boiler; continue

stirring until mixture thickens and a coating is formed on the spoon. Chill, and flavor with vanilla. If cooked too long the custard will curdle; if this should happen, remove immediately from the fire and whip with a Dover egg-beater.

GENERAL EXERCISES

From observations on Exercise II, how should a soft-cooked egg be prepared?

For a family of six, calculate the cost of a serving of soft-cooked eggs when eggs are 20 cents a dozen; 45 cents a dozen.

Repeat cost calculation for omelet.

Why are eggs beaten in making the omelet, and not beaten in making the custard?

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CHAPTER XII

CHEESE

Cheese is a food prepared from milk, but differs greatly from milk in composition. At least half of the water is removed from milk in the making of cheese. There is a great variety of cheeses, due to the kind of milk used and the methods of making and ripening. Ordinarily cow's milk is used, and the curd is separated by use of either acid or rennet. Where a large part of the water is removed, a hard cheese results, such as the ordinary American cheeses. The Neufchâtel is an example of a soft or cream cheese. The flavor of cheese is produced during the ripening process by the action of bacteria or molds. The familiar American or Cheddar cheese is ripened by bacterial action ; Roquefort, by molds.

Cheese varies greatly both in kind and composition, but, generally speaking, it is approximately one third each of water, fat, and protein. Cheese contains practically no carbohydrate, and the custom of eating it with crackers, or combining with rice, macaroni, or potatoes, is rational. Cheese is frequently called indigestible, but the reason for this is usually due to improper use. It is a highly concentrated food, consequently should not be eaten in very large quantities or added to the dessert at the end of a heavy meal. Cheese is frequently eaten for its flavor, but its food value should always be recognized when it becomes a part of the meal. A very desirable way of serving cheese is in combination with other foods, thus affording a large variety of cooked dishes.

LABORATORY EXERCISES

I. *Effect of Heat upon Cheese*

Add 2 T grated cheese to ½ c milk. Heat to boiling. Note results. Explain.

II. *Welsh Rabbit*

2 T flour	2 T butter
1 c milk	4–6 T cheese
1 egg yolk	

Prepare a white sauce with flour, butter, and milk. Add cheese (finely divided) and egg yolk. Remove from fire, and stir until cheese is melted; reheat, and serve at once on hot wafers or toast.

III. *French Rabbit*

Fill a baking dish with alternate layers of bread (which has been sliced, spread with butter, and cut into small squares) and cheese either grated or ground. Moisten this thoroughly with a mixture made in the following proportions:

1 c milk	Salt
1 egg	Cayenne pepper and mustard

Bake until thoroughly heated through and browned on top.

IV. *Cheese Crackers*

Sprinkle grated cheese thinly over crackers. Season with salt and cayenne pepper. Place in the oven until crackers are slightly browned.

V. *Cheese and Pimento Sandwiches*

½ c cheese	2 T cream or salad dressing
¼ c chopped pimento	Salt and pepper

Cottage, Neufchâtel, or any other soft cheese may be used. Cream the butter and spread very thin slices of bread. Spread

the filling on the slices of bread and pile in layers of from six to eight slices, having a piece of plain bread on top. When ready to serve, cut through the slices, making a layer sandwich.

GENERAL EXERCISES

Which one of the food principles in cheese is most affected by heat?

For a family of six, what is the cost of a serving of Welsh rabbit?

Note cost, flavor, and appearance of at least five different kinds of cheese.

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CHAPTER XIII

MEAT

The flesh of cattle, swine, and sheep furnish our common meats. Beef is from cattle, veal from calves, mutton from sheep, and lamb from the young sheep. Meat, milk, cheese, and eggs are the chief sources of protein. Protein from animal sources is expensive, and vegetable protein should be frequently used as a substitute.

Meat contains water, protein, fat, and mineral matter. The amount of water varies with the fat, which occurs in layers and also through the lean of the meat in portions so finely divided as not to be visible. The mineral content of meat is important from a dietetic viewpoint. Meat contains a group of substances called extractives. These are not nutrients, but they give to the meat its desirable flavor and consequently they should be considered in cooking meat. These extractives are soluble in water and may be quickly removed by hot water. They vary in kind and amount in different meats, and these, together with the fat, give each meat its characteristic flavor. As a muscle is used, the amount of extractives increases, consequently the highest flavored is very often the most used and the toughest. For example, a round steak is more highly flavored than a tenderloin.

Meat, or muscle, is made up of bundles of fibers bound together with connective tissue. Each of these bundles is made up of smaller bundles, the fibers being microscopic.

These little fibers are elongated cells filled with a fluid called protein. There are several proteins in meat, and some are soluble in cold water. Protein forms from 15 to 20 per cent of the meat. As a muscle is used the walls of the fibers thicken and harden, and the connective tissue increases in amount, so making a tough piece of meat.

1 2 3 4

BOTTLES SHOWING AVERAGE COMPOSITION OF ONE POUND OF BEEF

1, mineral salt, .16 oz.; 2, fat, 2.08 oz.; 3, protein, 3.04 oz.; 4, water, 10.72 oz.

The cuts of meat may be roughly divided into two classes, tough and tender. The toughness may be due to the amount and kind of connective tissue, or to the fact that the desirable changes which follow slaughtering have not taken place. The connective tissue increases in amount and toughness with age and hard work. For this reason, veal is more tender than beef; the porterhouse steak cut out from the back where the muscles are little used is more tender than the round cut from the leg where the muscles are in constant use. The best beef-producing cattle have certain

characteristics — wide back, thick flesh covering, short legs, etc. — and animals of this type that have been well fed produce first-grade meat. This, of course, is more tender and of a better flavor than that from lower-grade cattle. The fat should be evenly distributed through the meat; this means less waste, and in cooking bastes all parts much more effectively.

Meats undergo marked changes in texture after slaughtering. Immediately after the animal is killed the flesh is juicy and tender; very soon the death rigor develops, the muscles stiffen, and the meat is tough. Later on, due partly, at least, to the formation of acids, the flesh becomes softer and more tender, as in the first stage, and acquires an added flavor. In hot climates the meat is commonly eaten in the first or the second stage; in temperate climates, in the second and the third, and, of course, is much more palatable and tender if left until the third stage.

The effect of heat upon protein has already been shown with milk, eggs, and cheese, and the same general principles hold for cooking the protein in meat. The purposes of cooking meat are to develop flavor, improve appearance, kill any living organisms, and soften the connective tissues if they are present in large amounts. Since proteins are coagulated and hardened by heat, it is probably true that cooking diminishes ease of digestion, and it may remove considerable quantities of nutrients. The effect on connective tissue depends on whether dry or moist heat is applied. If the soft part, or the contents of the fibers, is scraped out and the remaining connective tissue placed in a smoking hot frying pan, the effect of dry heat can easily be seen. The tissue shrinks and hardens to a remarkable

degree, illustrating what happens when a tough cut, such as round, is broiled or roasted. If a similar piece were placed in water and simmered for a long time, the fibers would fall apart, and when the broth was cooled it would set more or less solidly. This is due to the fact that the moist heat has acted on the connective tissue, forming gelatin, which dissolves easily in the hot liquid and stiffens on cooling. The extractives, or flavoring materials in the meat, are dissolved out in hot water. The flavor is much more highly developed in meat cooked by dry heat, because of the higher temperature and also because of the browned outside. So we prefer the broiled steak or the roast if the meat is a tender cut.

Beef is divided by the butcher through the backbone into sides or halves, and then each of these is cut between the twelfth and thirteenth ribs into fore and hind quarters. The muscles of the four quarter run irregularly and there are more of them, so that the meat is usually of a lower grade and, therefore, cheaper than that from the hind quarter. The most tender and the most expensive cuts lie just back of the middle of the backbone, decreasing in value as either extremity is approached. The best part of the fore quarter is taken from the ribs and is usually cut into roasts. A rib roast is tender and may be roasted in an open pan with dry heat. The fore quarter includes the chuck, neck, etc., and belongs to the tough cuts, so they must either be ground or cooked by moist heat, as in pot roasts, stewing, braising, corning, or in soup. These cuts are fully as nutritious as the more expensive ones, and if properly cooked at low temperatures and well seasoned, they offer an excellent means of reducing the cost of food.

The most expensive and tender cut comes from the short ribs in front of the hips, and is known as the porterhouse cut. This cut is made up partly of the muscle called the tenderloin and partly of the sirloin. Where the tenderloin muscle ends, the loin cuts begin, and extend back to the rump cut. These are not so tender as porterhouse, but still are classed as tender cuts, and, therefore, are suitable for broiling. The rump piece is ordinarily cut into roasts, but usually needs the application of some moist heat to make the meat tender, and for this reason they are used as pot roasts. Below the rump lies the round, a piece of meat that has little waste and good flavor. The inside, or top, round from a first-grade animal makes a fairly tender steak when broiled; the outside, or bottom, round is less desirable, and unless one is sure of the grade of the beef, moist heat or grinding is usually advisable.

In estimating the relative cost of the various cuts, the amount of waste must be taken into consideration; for example, chuck ribs ordinarily sell for from 10 to $12\frac{1}{2}$ cents per pound, round from 15 to 18 cents per pound, and porterhouse from 25 to 30 cents per pound. Of the chuck ribs at least one half is waste; of the round only about one twelfth; and of the porterhouse about one eighth. The real cost of the edible portions then of the three cuts mentioned at 10, 15, and 25 cents per pound, respectively, would be 22, $16\frac{1}{2}$, and $28\frac{1}{2}$ cents, showing that the round because of its small percentage of waste is by far the cheapest.

As has already been said, protein is coagulated and hardened by heat. The higher the temperature, the harder and tougher the product. Therefore we use a high temperature

only at the beginning of the cooking process to form a coating over the outside which will retain the juices, and then lower the heat so that the interior may not be toughened and its juices coagulated. For this reason steaks should not be cut too thin ; never less than three quarters of an inch thick, and thicker than that is desirable.

The methods of cooking meat by application of dry heat are broiling, pan broiling, oven roasting in an uncovered pan, or roasting before an open fire. The steak may be broiled under gas or over glowing coals, and if properly done will be well browned on the outside and juicy and pink on the inside. A steak that is gray all through will not be juicy, because the proteins dissolved in the juices have all been hardened by the heat. The steak should be first seared on either side to retain the juice, then moved farther from the flame so that the interior will not be overcooked. Frequently it is more convenient to broil in frying pan or skillet. In this case the pan should be smoking hot and may be rubbed lightly with a bit of fat to prevent sticking. As soon as the meat is browned on either side, the heat should be reduced as in ordinary broiling. If fat collects in the pan, it should be poured off, otherwise the meat will be fried rather than broiled and will lose in flavor.

A number of experiments in the roasting of meat were carried on at the University of Illinois, and it was found that for a tender cut the closed pan did not give as satisfactory results, as far as flavor and appearance were concerned, and the losses were greater than where an open pan was used. The same principle of high heat at first for searing and then a lower heat to finish the cooking applies here also. If the fat side is placed uppermost in the pan,

basting will not be found necessary. If the roast is lacking in fat, lay a piece of suet on the uppermost side.

The methods of cooking meat by the application of moist heat are stewing, braising, steaming, etc. By browning the meat first, a good flavor is produced and probably more of the juices are retained. In stewing, the meat is cut into smaller pieces and is served with the broth or gravy so that none of the flavor and nutritive material will be lost. In braising, the meat is placed in a covered pan in the oven and steamed in its own juice. A pot roast is similar, except that it is cooked in a kettle on top of the stove. A small amount of water is usually added in both cases, and the meat may be floured and browned in smoking fat before the water is added. The temperature after the browning process is finished must be low. This method may be used with steaks also, browning thoroughly, then adding a small amount of water, covering closely, and cooking for a long time over a very slow fire.

Unless the broth is served with the meat, quite a little of the nutritive and flavoring material may be lost, since the extractives, mineral matter, and some of the protein will dissolve in water. The scum which covers the surface of broth is mostly made up of the dissolved protein which has been hardened by heat, as are also the settlings. In a clear broth this scum and any solid particles are usually carefully removed before serving, so that there is little left in the broth but some mineral salts and the extractives.

The strong meaty flavor deceives many people who imagine that because of it the broth is nourishing. These extractives are allied to the stimulating substances found in

tea and coffee, and therefore the broth has some value as a stimulant, often whetting the appetite, but in cases of severe illness it should not be given unless ordered by a physician. It is commonly thought that the most expensive cuts of meat have the best flavor, but it is frequently true that the extractives are better developed in the muscles which have been used more, and are in consequence tougher. The use of dry heat, which is possible only with the more tender cuts, does tend to develop flavor, and because of the ease of mastication the flavor is more easily detected in the tender cuts. While the extractives are not nutritious, their value as digestive stimulants must not be underrated.

Good meat is bright red in color and has fat evenly distributed through it. The fat should be light yellow and firm. The price of meat is regulated by its tenderness rather than by its nutritive value. The tougher cuts require more skill in preparation, more time, and more fuel, although usually the cost of the extra fuel does not equal the extra cost of the tender meat.

LABORATORY EXERCISES

I. *Effect of Dry Heat upon Protein*

From a three-inch square of round steak scrape out the soft portion with a dull knife. Form this into a ball. Place the soft ball, and the connective tissue from which it has been scraped, in a hot frying pan. Carefully watch the connective tissue while heating. Examine both after cooking and explain results.

II. *Effect of Moist Heat upon Protein*

Soak 1 T ground beef in 2 T cold water for several minutes. Strain and place in a test tube.

Mix 1 t white of egg with 2 T cold water and place in a test tube. Heat both test tubes. Explain results.

III. *Tender Cuts*

1. *Pan-broiled porterhouse steak or chops.* Note weight as purchased. Weigh all edible portions and calculate the cost. Wipe with a damp cloth and trim off ragged edges and excess of fat. Put into a smoking hot frying pan without any grease. Turn several times until both surfaces are seared and brown. Finish cooking at a lower heat, turning occasionally. Salt sides of meat just as the cooking is finished. Serve on a hot dish.

2. *Beef roast* (*ribs*). Calculate cost of the edible portion as in exercise III. See that the meat selected is clean. Trim off any ragged portions, but do not remove fat. Place a rack in the pan, arranging to have the larger cut surface exposed to the direct heat of the oven. The part with the greatest surface of fat should be placed uppermost, to do away with the necessity of basting. Place in a very hot oven, maintaining this heat for 15 or 20 minutes, after which the heat should be lowered and the roasting continued, allowing from 15 to 20 minutes for each pound, according to the shape of the cut and the degree of cooking desired. Remove roast to a hot platter and pour hot fat from pan. Make gravy in pan in which roast is cooked. Measure flour and fat in the proportion of 2 T of each to 1 c water. Thoroughly mix and brown fat and flour. Remove from fire and gradually add the water, stirring constantly. Boil, season, and serve hot.

IV. *Tough Cuts*

1. *Pressed veal.* Cook a shank of veal until very tender, so that meat can be easily picked to pieces. Let the water cook down until about 1 c of the liquid remains. Pick the veal apart, season with salt, pepper, and sage if desired. Pour over this the liquid from the vessel in which the meat was cooked. Mix

thoroughly and pack closely in a pan of proper shape to make good slices when the meat is cold. When set, cut in thin slices and serve.

Hard-cooked eggs may be packed into center of mold.

2. *Swiss steak.* Pound a liberal quantity of flour into a piece of round steak on both sides. Season well and sauté in very hot suet drippings until a good brown crust is formed. Then add sufficient water to barely cover, and simmer slowly for from 1 to 1½ hours. It may be necessary to add a little water occasionally. When ready to serve there should be just enough liquid to moisten the meat thoroughly. Onion or tomato juice may be added to vary the flavor. Calculate cost of edible portion as in exercise III.

3. *Brown stew.* Cut lean beef into cubes; neck beef will be found quite satisfactory for this. Season each piece with salt and pepper; dredge thoroughly with flour and brown well on all sides in a frying pan, using a little suet to prevent sticking and to give necessary fat. Add sufficient water to cover meat, and when this has boiled up once, turn into a double boiler and cook for 3 hours. Diced vegetables may be added, toward the end of the cooking, if the flavor is desired. If gravy is thin, pour off and thicken.

4. *Pot roast.* Use a cut from the round, the rump, or the shoulder. Season with salt and pepper and dredge with flour; then brown entire surface in pork fat or suet. Add a little boiling water, cover closely, and cook slowly for several hours (4 hours is not too long for a 4- or 5-pound roast). Vegetables may be added if desired. Less water may be added and the meat cooked in the oven. The water around meat in either case should be kept below the boiling point. Why?

The liquor around this meat makes an excellent foundation for gravy.

Meat Substitutes

By a meat substitute is meant a dish which contains enough protein so that it can reasonably take the place of meat at a meal. Meat substitutes may be found from both vegetable and animal sources, but the former are cheaper.

List the dishes suggested in this book which might serve as meat substitutes. Discuss the comparative cost and food value. Suggest other substitutes.

Materials, such as rice, potatoes, dumplings, and macaroni, are frequently cooked with meat, thereby gaining its flavor and lessening the amount of meat eaten. These are called meat extenders, and their use helps to reduce the cost of food. These extenders are useful when a small quantity of meat is on hand.

Meat Left-overs

Portions of meat left over are too frequently thrown away, or so poorly prepared that they might as well have been thrown away. The use of left-overs requires some skill and care, but throwing them away is extravagance. More thought about quantities purchased would frequently result in no left-over portions. In preparing left-overs the result should always justify the extra materials added, the time, and the fuel used in preparation. In the second cooking of meat it must be remembered that little cooking should be done, or the meat will be dried and unappetizing. Extra flavorings are usually added, for the original flavor of the meat is lost.

LABORATORY EXERCISES

I. *Minced Meat*

Chop or grind cold meat, heat with some of the gravy, and season with celery salt or onion juice. Serve on buttered toast.

II. *Escaloped Meat*

Put into a baking dish alternate layers of macaroni or rice, and chopped or ground meat. Pour over it brown gravy or tomato sauce. Cover with buttered crumbs and bake until dish is heated through and crumbs are brown.

III. *Browned Hash*

Mix together equal parts of chopped meat and chopped cold boiled potatoes. Moisten slightly with gravy or stock. Season and place in heated frying pan containing a little fat. Press compactly into one half of the pan; heat slowly until brown. Turn onto a platter and serve with tomato sauce.

IV. *Beef Croquettes*

1 c cold beef (ground)
Salt and pepper
1 T melted butter
1 or 2 t onion juice
A few drops Worcestershire sauce
Enough gravy or meat stock to moisten well

Add ingredients to meat, shape, roll in flour, egg, and crumbs. Fry in deep fat and serve with tomato sauce.

V. *Meat Salad*

Left-over portions of veal, chicken, or ham may be mixed with celery or cabbage and dressed with salad dressing.

GENERAL EXERCISES

List the market prices of the common cuts of meat.

For a family of six, calculate cost of a porterhouse and a Swiss steak.

With the cost of the serving of meat just calculated, compare the cost of a serving of eggs at 20 cents a dozen; at 45 cents a dozen.

For a family of six, calculate the cost of a rib roast and a pot (rump) roast.

In which of the above illustrations would a fireless cooker be useful?

What makes the pressed veal "set," after the liquid is poured over the meat?

Do you think that the usual objection to tougher and cheaper cuts of meat is well founded?

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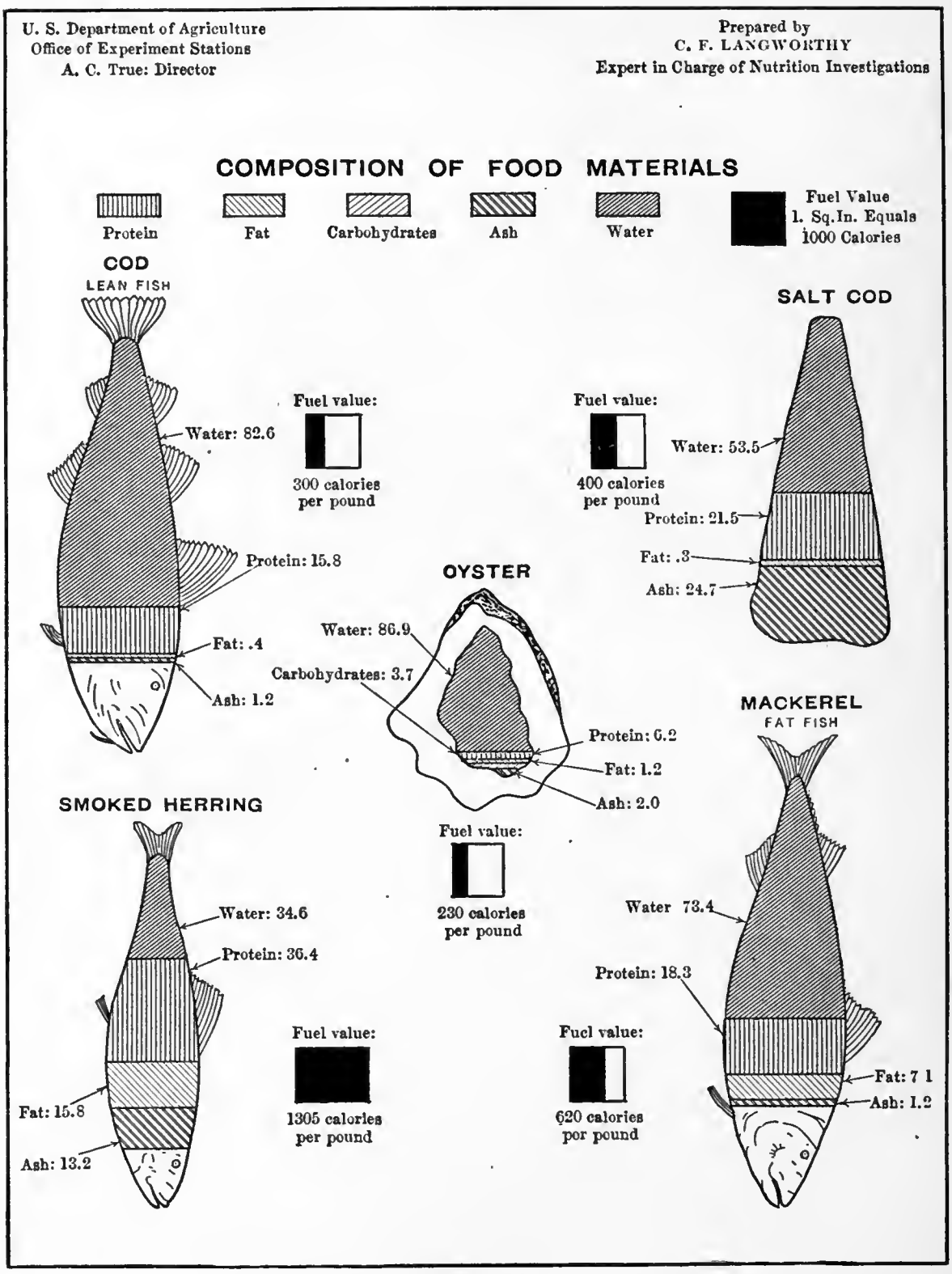
CHAPTER XIV

FISH AND OYSTERS

The flesh of fish resembles the flesh of other animals in composition. The muscle fibers are shorter, coarser, and are bound with much less connective tissue. Generally speaking, fish contains more water than meat and much less fat. A few of the commonly eaten fish, such as salmon, contain fat in greater quantity, but these do not contain more than half of the quantity found in a piece of moderately fat beef. The flavor of fish is very characteristic, and its use affords variety to the diet. The flavor of freshly caught fish is far superior to that which has been kept even a short time. Unlike meat, fish should not be kept, but used immediately. Fish lends itself to various methods of preparation, and is good in combination with other things. The all-too-frequent habit of frying fish has possibly led to its disfavor with many people. In selecting fish on the market, choose only those with firm flesh and bright eyes. Fish spoils very quickly on removal from cold storage.

Oysters are another form of sea food very commonly used. These are valued for their flavor rather than for their nutritive value. They have approximately the same composition as milk, and cost from five to ten times as much as milk. Some danger attends the eating of raw oysters, due to the fact that they are sometimes fattened



FISH, FISH PRODUCTS, AND OYSTERS

in sewage-polluted water. The laws for food inspection have done a great deal to correct this evil, but outbreaks of typhoid fever have been traced to the eating of raw oysters.

LABORATORY EXERCISES

I. *Boiled Fish*

To each quart of water in which fish is to be cooked add 1 t salt and 1 t vinegar. Small fish should be cooked whole. For preserving the shape and appearance of the fish it is desirable to wrap it in a piece of cheesecloth, which is also an aid in handling the fish. A wire basket is convenient for cooking fish in water. Put the fish into the boiling water and cook at the simmering point until the bones and flesh will readily separate. Drain water from the fish; bone, and serve with suitable sauce.

II. *Baked Fish*

Clean fish; the head and tail may or may not be removed. The fish may or may not be boned. Rub inside and out with salt and pepper. Fill the cavity with stuffing, allowing it room to swell slightly. Sew the slit over with strong thread, taking stitches so deep that they will not tear out. Brush over with melted butter and dredge with flour. If the fish is lean, lay strips of fat pork over it. A little water should be added to the pan. Bake from 40 to 60 minutes, basting occasionally. When done, remove strings and strips of bacon.

Garnish with lemon and parsley and serve with a suitable sauce.

III. *Fish Stuffing*

1 c bread crumbs	A few drops of onion juice
$\frac{1}{4}$ c melted butter	1 t chopped parsley
$\frac{1}{4}$ t salt	$\frac{1}{8}$ t pepper

1 t chopped cucumber pickle, if desired

This is a dry dressing. If a moist dressing is desired, water or meat stock may be added.

IV. *Sauces*

1. *Maître-d'hôtel butter*

¼ c butter	¼ t pepper
½ t salt	1 T chopped parsley
1 T lemon juice	

Cream butter in a bowl; add salt, pepper, parsley, and then slowly, lemon juice.

2. *Drawn-butter sauce*

⅓ c butter	1½ c hot water
3 T flour	Salt and pepper

Melt ½ the butter, add flour and seasonings, and pour hot water on gradually. Cook thoroughly and add remaining butter cut into small pieces. May be served with broiled or baked fish. In the latter case, add 1½ T lemon juice or vinegar.

3. *Tartar sauce*

1 T vinegar	¼ t salt
1 t lemon juice	1 T Worcestershire
⅓ c butter	sauce

Mix vinegar, lemon juice, salt, and Worcestershire sauce, and heat over hot water. Brown butter and strain into mixture.

V. *Escaloped Salmon*

1 c flaked salmon	1 c white sauce

Remove salmon from can, separate skin and bone, and flake the salmon. Put alternate layers of fish and white sauce in a buttered baking dish, cover with buttered crumbs, and heat in oven until brown.

VI. *Codfish Balls*

¼ c salted cod	½ c potatoes
½ egg	White pepper
½ t butter	Salt, if needed

Wash the fish in cold water and break into small pieces. Wash and pare the potatoes and cut into pieces. Cook the fish and potatoes together in boiling water until the potatoes are soft. Drain, shake over the fire until dry, mash with a fork, add the beaten egg, butter, pepper, salt if needed, and beat until light. Take up by spoonfuls, mold slightly, and cook in deep fat. Or shape into croquettes, roll in egg and crumbs, and fry in deep fat.

VII. *Creamed Oysters*

1 c oysters	3 T butter
Pepper	3 T flour
Salt	1 c milk

Set oysters to drain. Make a thick white sauce of the other ingredients, add the oysters just before time to serve, and cook only long enough to heat them thoroughly. The oysters should be plump when served — not heated until they shrink.

Fish Left-overs

VIII. *Escaloped Fish*

2 c cold flaked fish	Bit of bay leaf
1 c white sauce	1 slice onion
1 c milk	Salt and pepper
Few sprigs parsley	½ c buttered crumbs

Heat milk with parsley, bay leaf, and onion until well seasoned, and make into white sauce. Arrange fish and white sauce in a buttered baking dish in alternate layers, cover with buttered crumbs, and brown in hot oven.

IX. *Fish Croquettes*

Moisten 1 c cold flaked fish with a thick white sauce. Cool and shape into croquettes; roll in flour, then in egg and in crumbs, and fry in deep fat. Cold hard-cooked eggs or parsley may be cut up and added to the croquette mixture.

X. *Creamed Fish*

1 c cold flaked fish	4 T chopped pimento
1 c white sauce	1 hard-cooked egg

Reheat fish with pimento and egg in white sauce.

GENERAL EXERCISES

For a family of six, calculate the cost of a serving of fresh fish and compare with cost of meat. Repeat with escaloped salmon and creamed oysters.

Where are oysters grown, how obtained, and how shipped?

Is the frequent warning against eating raw oysters well founded?

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CHAPTER XV

GELATIN

Gelatin is a substance derived from animal sources. It is closely related chemically to the other proteins which have been discussed, but it does not serve the purpose in the body which some of these do. It is prepared commercially by boiling bone, gristle, skin, etc. in water, and then purifying. Gelatin is odorless, colorless, and tasteless in the pure state. It swells in cold water and dissolves in hot water. On cooling, a gelatin solution "sets," or "jellies." In this respect gelatin is similar to certain substances in plants which also set, or jelly, water solutions. Certain sea plants, such as mosses and agar, yield substances which have this property, and preparations of these are on the market under various names. In the ordinary fruit juices is found another substance — pectin, a carbohydrate — which causes these juices to jelly. While some other substances will form a jelly, chemically they are not the same as gelatin, and do not have the same food value. Gelatin is generally used in the preparation of desserts, where it is valued as a carrier of flavor and for its texture and consistency. A very small per cent of gelatin is required to jelly a solution, so that the amount of gelatin ordinarily used is small.

Gelatin is prepared in sheets and in granulated form. The latter may be bought in bulk or in small packages.

It is most frequently used with fruits, both fresh and canned, but fresh pineapple should never be used because the gelatin will lose its power to jelly, due to the action of the enzyme in the pineapple.

LABORATORY EXERCISES

I. *Jellied Prunes*

½ lb. prunes	3 t gelatin
1 c sugar	¼ c lemon juice

Soak and cook prunes, remove stones, and cut into pieces. To the prune juice add enough boiling water to make 2 cupfuls. Soak gelatin in 4 T cold water; when soft, dissolve in hot prune juice, and add sugar and lemon juice. Add prunes and chill. Stir occasionally during cooling process so that the prunes may not settle when the jelly sets.

II. *Orange Whip*

4 t gelatin	½ c cold water
1 pt. orange juice	Juice 1 lemon
Sugar	

Soak gelatin in cold water and dissolve in hot water. Strain into this the fruit juice and sugar to taste. Set aside until partly jellied and then whip with Dover egg-beater until it becomes white and frothy.

What causes the change of appearance on beating?

III. *Snow Pudding*

2 t gelatin	1 c sugar
¼ c cold water	¼ c lemon juice
1 c boiling water	Whites 3 eggs

Soak gelatin in cold water, dissolve in boiling water, add sugar and then lemon juice. Cool; when it thickens, beat with

an egg-beater until light. Add stiffly beaten whites of eggs and continue beating until mixture is stiff enough to hold its shape. Serve cold with custard sauce.

IV. *Tomato Jelly*

1 c tomato juice	1 t gelatin soaked in
1 slice onion	2 T cold water
1 stalk celery	¼ t sugar
¼ bay leaf	Salt
1 clove	Paprika

Simmer tomato juice and seasonings for 5 minutes. Add soaked gelatin to the hot tomato juice. Strain and pour into molds to set. Serve on a lettuce leaf and with a salad dressing.

GENERAL EXERCISES

Calculate the cost of the three puddings and the number of people served by each. How much would the cost be increased by serving whipped cream with them?

Can you suggest the reason for the condition of a cold veal or beef soup stock?

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CHAPTER XVI

FATS AND OILS

Fat is found in both plant and animal foods, as previously stated, and is practically always used as a food in combination with other things.

The cooking of food in fat is a favorite method with many people because of the flavor which is developed, but the frying of food is more common than it should be, even though by proper care food may be cooked in fat without becoming grease soaked. Food which is soaked in fat is more slowly and less easily digested. Harm may come from overheating fat in the cooking, for heat causes fat to decompose into substances which are irritating to the digestive tract. Fats vary not only in the melting point but in the temperature at which they decompose by heat. Generally speaking, oils may be heated to a higher temperature without decomposing than the solid fats, and consequently they make a very desirable medium for cooking. The cooking oils usually cost less than the solid fats, and, due to higher point of decomposition, may be used a greater number of times. Deep-fat frying has some advantages over frying in a small amount of fat, since the object to be cooked is immediately immersed in it and a protective coat is formed against the absorption of fat. Care should be taken in cooking in a large quantity of fat because it is inflammable and accidents may occur. Articles,

such as potatoes, which contain a large amount of water will cause the fat to sputter, due to the expansion of the water to steam, and such articles should be added slowly.

A large number of cooking fats are on the market at the present time. Some of these are compounds or mixtures of different animal and plant fats. If properly prepared, there is no objection to their use, and frequently they save money for the buyer. Sometimes old and rancid samples are bought, and on account of the one poor sample, all of these special preparations are unjustly condemned. Any unpleasant flavor detected in foods where these are used is practically always due to the rancidity and not, as is frequently supposed, to the character of the fresh fat.

LABORATORY EXERCISES

I. *Effect of Heat upon Fats*

Heat butter, lard, some commercial compound, and a cooking oil, and note point of decomposition as shown by smoking point.

II. *Types of Commercial Fats and Oils*

Observe samples of some common fats and oils, noting source, physical characteristics, price, and use.

III. *Ice Cream*

Ice cream in its simplest form is sweetened and flavored cream. Cream is a very expensive form of fat and sometimes an acceptable substitution may be made for it. In the directions given below the ingredients vary and the cost of each should be computed. Calculate the cost when a thin (16 per cent) cream is used, and the cost when double cream is used.

1. *Ice Cream*

4c cream

$\frac{3}{4}$c sugar
Flavoring

Mix ingredients and freeze. Use a freezing mixture of 3 to 4 parts ice and 1 part salt.

2. *Ice Cream*

4 c cream	1 egg
2 c milk	1 T cornstarch
1 c sugar	Flavoring
	Pinch of salt

Mix cornstarch with 1 c cold milk and boil. Remove from fire and stir in the slightly beaten egg. Stir until smooth; then add the other ingredients and freeze.

IV. *Saratoga Chips*

Wash and pare potatoes. Cut into very thin slices in a bowl of cold water. Let stand for from 15 to 20 minutes. Drain off water and dry potatoes in a towel. Fry in deep fat until light brown. Drain on brown paper and sprinkle with salt.

Fry half of potatoes in lard and the rest in some other kind of fat. Compare in desirability and cost.

V. *Potato Croquettes*

2 c hot riced potatoes	½ c grated cheese
2 T butter	1 egg
½ t salt	Few grains cayenne

Shape into desired form, roll in crumbs, egg, and again in crumbs. Fry in deep fat. Drain on paper in oven.

GENERAL EXERCISES

To what extent may lard be used in place of butter?

May any of the other fats be substituted for butter, and when?

What is the objection to fried potatoes as they are frequently prepared?

What other foods are often fat soaked?

Name the objections to foods which are saturated with fat. How may this difficulty be avoided?

Why is cooking in fat a common and favorite method of preparing food?

What is the danger of cooking in deep fat?

Are fats in general cheap or expensive foods?

Name some of the cheap and some of the expensive fats.

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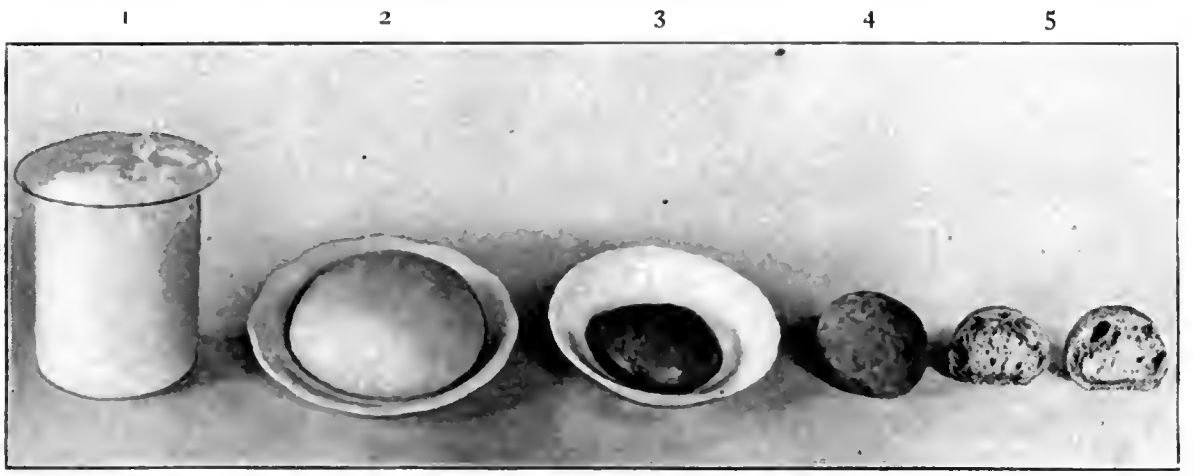
CHAPTER XVII

FLOUR

Flour is a very familiar preparation from the cereal wheat. In the milling of wheat, the outer (bran) layers and the germ are removed, and the inner starchy portion is finely ground into flour. Flour is largely starch (from 70 to 75 per cent), but it contains protein, varying with the kind of wheat. Water, mineral matter, and a very small amount of fat make up the rest of the content. The protein of the flour possesses some interesting characteristics. Protein of wheat occurs chiefly in the form of glutenin and gliadin, and when water is added, these two unite to form a sticky substance called gluten. This is already familiar to many as the chewing gum obtained from the wheat kernels. Gluten is an elastic substance which is readily stretched as the contained air or moisture expands. Like the other proteins discussed, gluten is hardened by heat. In the making of bread this is of considerable importance, for the expanded and hardened gluten forms the support or framework of the loaf.

There are many varieties of wheat, and these vary not only in physical characteristics but in composition. In the more moderate climates in the United States the wheat is planted in the fall and left in the ground through the winter. This is generally known as winter wheat. In the Northwest, where the winters are severe, the seed is sown

in the spring, and these are known as spring wheats. The spring wheats are harder and more difficult to mill than the winter wheats. In some of the semiarid portions of the country the very hard Russian wheats are grown. These are known as durum (hard) wheats, the name indicating one of their characteristics. The durum wheats usually run quite high in protein, and are sometimes blended with other wheats in the milling process. The



BAKED GLUTEN FROM TWO CUPS OF FLOUR

1, flour; 2, dough from same; 3, gluten from same; 4, gluten baked; 5, baked gluten cut open

durum wheats are very desirable for the making of macaroni, and some varieties are excellent for bread.

In all wheats the quality of the gluten is an important factor in bread making. Flour made from a single variety of wheat is not usual. The miller mixes or blends different wheats to make a more desirable flour. Generally speaking, the winter wheats are more starchy, which makes them especially desirable for the making of cake and pastry, and many of them make excellent bread, while the spring wheats are higher in protein and better adapted to the making of bread than the making of pastry. The harder

varieties of the winter wheats and the softer spring wheats resemble one another in composition. It is not infrequent, however, to find a flour which is good for both pastry and bread, due to the wise blending of wheats in the milling. The flour of the starchy winter wheats is white and soft, while that of the spring wheats is more granular, and creamy in color.

The complaints frequently made against a flour are not always just, for they often arise from a failure to recognize the kind of flour and the use to which it is adapted. A good flour should be a clear white or cream in color; a gray flour indicates poor quality, and in no case is a musty smell permissible.

Graham and whole-wheat flours are also prepared from wheat. The original graham flour was made by grinding the whole wheat kernel without removing any portion of it. Substitutes for this are sometimes found on the market, which are mixtures of bran with an inferior quality of flour. In whole-wheat flour the outer bran layers are removed, and the whole is ground finer than in the graham. It is frequently stated that graham and whole-wheat breads have greater food value than the plain white bread, due to the fact that the whole wheat kernel is used in preparing the former. While percentage composition seems to favor the claim, it is also misleading. Bran stimulates peristalsis, and so hastens food through the digestive tract, and its passage may be so rapid that absorption is partially prevented, thus causing a loss of nutrients. The laxative action of bran has been attributed to the mechanical irritation of its particles, but recent work indicates that this action is largely due to the phosphorus compounds.

Rye, barley, buckwheat, corn, and some other cereals are ground into meals and flours. Rye flour is often used for making bread; but the gluten, if present, in the other cereals is of such a nature that they do not make good bread. Corn meal is made into a bread by combining white flour or egg with it.

LABORATORY EXERCISES

I. *Flours*

Examine graham, whole-wheat, and white flour, rye flour, and corn meal.

Sift and examine residue of wheat preparations; compare.

What is the percentage composition of these flours?

II. *Gluten*

Measure ½ c of ordinary white flour and mix with it enough water to form a stiff dough. Work in the hands until it becomes smooth and elastic, and then wash it until the water is clear. What is left? What has been removed? Bake the residue in a moderate oven for from 30 to 45 minutes.

GENERAL EXERCISES

Is spring or winter wheat grown in your vicinity?
What varieties of wheat are ground by your local miller?
What kind of flour is used in your home?
Is more than one kind of flour kept in your home?
What flour does your local baker use? Why?
What guides the baker in his choice of flour?
What guides the housewife in her choice of flour?
Why is a blended flour desirable?

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CHAPTER XVIII

FLOUR MIXTURES

In the household we are familiar with a large number of flour mixtures, both batters and doughs. In all these mixtures flour is combined with moisture and some leavening agent, whatever else may be added. Water is the liquid most commonly used, but sweet and sour milk and buttermilk are frequently substituted for water. On mixing the flour with the liquid, gluten is formed. As explained before, the gluten is expanded by gas and steam, and if heated while in this stretched, or expanded, condition, the gluten is hardened and forms a sort of framework for the other ingredients of the loaf. Exercise II in the previous chapter illustrates this characteristic of gluten.

The third essential to the flour mixture is a leavening agent. Flour and water mixtures are heavy, and it is necessary to provide some means for lightening, or leavening, them. To accomplish this, air may be beaten into the mixture directly, as in the beaten biscuit of the South, or air may be added after it has been beaten into the white of egg. Carbon-dioxide gas is the most common leavening agent and is supplied by the action of yeast or of certain chemicals. The chemicals used are baking soda and some acid. The acid may be one of several combined with the soda to form a so-called baking powder, or the acid may be supplied in the cooking materials, such as sour milk or

molasses. The moisture used in all these mixtures is expanded into steam during the cooking process, and this also helps to make the mixture light.

While flour, water, and a leavening agent are necessary to any flour mixture, the resulting product would not be very palatable, and therefore other materials are added to modify both flavor and texture. Salt is necessary in practically every case. Milk, eggs, fat, and sugar are commonly used, and all these add to the food value. Other materials, such as spices and extracts, are valued for their flavor. Eggs not only serve as a means for introducing air into the mixture, but, on heating, the albumen of the egg hardens and aids in forming a framework for the mixture. Fat affects the texture, tenderness, and flavor in proportion to the quantity used. Sugar is valued for its flavor, but it also affects texture. The proportion of liquid to flour in these mixtures varies greatly. Thin mixtures are called batters; the thicker ones are called doughs.

Practically all flour mixtures are baked, although fat and steam are used in some cases as the cooking mediums. In applying heat to any food its composition should be kept in mind. This is rather simple when we are cooking eggs alone or starch alone, but where different substances are combined, it is necessary to regard the material which predominates, and a compromise is usually necessary. In most of the flour mixtures starch is present in large quantity, and this calls for thorough cooking at a high temperature. In mixtures in which a large amount of egg is used, as in sponge cake, a low temperature is required and the time of baking is prolonged.

LABORATORY EXERCISES

I. *Oven Tests*

Repeat oven tests as given in Chapter I.

II. *Baking Temperatures*

Discuss the baking temperatures which will be desirable for the mixtures in the following exercises:

III. *Batters with Air and Steam as Leavening Agents*

1. *Popovers*

1 c milk	1 T fat
1 c flour	¼ t salt
1 egg	

Mix salt and flour; gradually add milk, in order to keep mixture smooth; then add melted fat and unbeaten egg. Beat thoroughly with Dover egg-beater or spoon. Pour at once into hot gem pans and bake for from 40 to 45 minutes in a moderate oven. They should be served as soon as cooked.

All materials and utensils should be ready and fire lighted before mixing is started.

2. *Sponge cake*

Yolks 2 eggs	Salt
Whites 2 eggs	Lemon rind
⅓ c sugar	1 t lemon juice
⅓ c flour	

Beat yolks until lemon colored and thick. Add sugar gradually and continue beating. Then add lemon juice, rind, and whites of eggs beaten until stiff and dry. When white is partially mixed with yolk, carefully cut and fold in flour mixed and sifted with salt. Bake in an unbuttered pan in a slow oven for from 35 to 45 minutes.

What makes this mixture light?

3. *White sponge cake*

½ c white of egg	¼ t cream of tartar
⅝ c granulated sugar	Flavoring
½ c flour	

Sift flour once before measuring and several times afterward. Beat egg until very stiff, adding the cream of tartar, and gradually beat in the sugar. Then add flavoring and carefully fold in the flour. Do not stir or beat more than is necessary to mix. Pour into an unbuttered pan and bake for from 40 to 50 minutes in a very slow oven.

IV. *Baking Soda*

Acid of some sort must be added to soda to free carbon dioxide. Molasses contains a mixture of organic acids; sour milk contains lactic acid.

1. Into a tablespoon of sour milk stir a pinch of soda. Watch results. Explain.

2. Repeat, using molasses.

V. *Batters with Soda and Sour Milk or Molasses as Leavening Agents*

1. *Gingerbread*

1 c molasses	1 egg	⅓ c butter
½ c sour milk	1½ t soda	2 t ginger
2 c flour	½ t salt	

Sift together all dry ingredients. Cream the butter, add molasses and beaten egg, and then add to this the flour and milk in turn. Beat the whole thoroughly and turn into a greased pan. Bake in a slow oven.

2. *Sour-milk griddlecakes*

2½ c flour	2 c sour milk	½ t salt
1¼ t soda	1 egg	

Mix and sift dry ingredients. Add these to the milk, beat well, and lastly add the beaten egg. Cook on a hot griddle. No grease is required if an aluminium griddle is used.

3. *Corn bread*

1 c corn meal	1 T melted butter
1 c sour milk	½ c sifted flour
¼ t salt	1 t baking powder
1 t soda	1 egg

Sift together all dry ingredients, stir these into the milk, and then add butter and beaten egg. Bake in a moderate oven.

VI. *Baking Powder*

Baking powder is a mixture of an acid and an alkaline constituent which will yield a gas in the presence of moisture. The alkaline constituent is almost always the ordinary baking soda, which is sodium bicarbonate. The acid constituent varies with the brand of the baking powder, and may be a phosphate, tartrate, or alum salt. The commercial baking powder contains a third substance, usually starch, which tends to absorb the moisture from the air and prevent premature development of gas from the other two substances. Oftentimes in the household baking soda and cream of tartar are added to a flour mixture. This serves the same purpose as baking powder.

1. Mix ¼ t soda and ½ t cream of tartar. Stir this into a half glass of water and observe results.

2. Stir 1 t baking powder into a half glass of water and observe. (Save this for 4.)

3. Half fill two glasses with water. Into the first stir 1 t of a tartrate baking powder; into the second stir 1 t of a phosphate baking powder. Do you note any difference in the rapidity of action?

4. Boil the mixture left from 2 and note results. Explain.

VII. *Batters with Baking Powder as a Leavening Agent*

1. *Griddlecakes*

1¼ c flour
¼ t salt
1 c milk
1 egg
2 t baking powder

Sift dry ingredients, stir into the milk, and lastly add the beaten egg. Cook on a hot griddle.

2. *Muffins*

2 c flour
1 egg
½ t salt
2 T sugar
1 c milk
4 t baking powder
2 T melted butter

Sift dry ingredients, stir into milk, and add melted butter and beaten egg. Beat the mixture thoroughly and pour into greased pans. Bake in a quick oven.

3. *White cake*

½ c butter
2 c sugar
1 c water
3 c flour
4 t baking powder
Whites 5 eggs
1 t vanilla

Cream butter, add sugar, and thoroughly mix. Sift flour and baking powder several times, add this, alternating with the water, to the first mixture, and then add vanilla. Fold in the stiffly beaten whites of eggs and pour into a greased pan. Bake in a moderate oven.

Boiled icing

1 c sugar
⅓ c water
White 1 egg
Lemon juice or flavoring
⅛ t cream of tartar

Cook sugar, cream of tartar, and water together until sirup will thread. Pour in a fine stream into well-beaten white of egg, beating until smooth and thick enough to spread upon the cake.

Flavor and pour over cake, spreading with spatula. If beaten too long, thin with a few drops of lemon juice or boiling water and wet the knife in cold water. Ice the cake and calculate the cost of cake and icing.

VIII. *Doughs*

The difference between doughs and batters is in the amount of moisture used with the flour. Batters have one or two measures of flour to one of liquid. Doughs have about three measures of flour to one of liquid.

1. *Biscuit*

- 1 c flour
- 2 t baking powder
- ¼ t salt
- ⅜ c liquid, equal parts water and milk
- 1½ T fat

Sift dry ingredients, work fat into flour, and gradually add the liquid, mixing into a very soft dough just stiff enough to roll. Turn onto a floured board, roll to ½ inch in thickness, cut, put into a floured pan, and bake in a quick oven.

2. *Shortcake*

- 2 c flour
- 4 t baking powder
- ½ t salt
- 1 T sugar
- ¼ c fat
- ¾ c milk

Mix the same as biscuit, roll about ¾ inch thick, and fit into a pan for baking. When done, split and spread with butter, cover with crushed and sweetened fruit. Add the top layer of shortcake and cover generously with fruit and juice before serving.

3. *Doughnuts*

- ½ c sugar
- 1 T butter
- ½ c milk
- 1 egg
- 3 t baking powder in 1½ c flour
- ¼ t salt
- cinnamon
- nutmeg

Beat thoroughly butter, sugar, and egg. Sift dry ingredients and add, alternately with milk, to the first mixture. Add enough more flour to make a soft dough, turn onto a floured board, roll to $\frac{1}{2}$ inch in thickness, cut, and cook in deep fat.

GENERAL EXERCISES

What is the leavening agent in each of the foregoing illustrations?

What furnishes the moisture?

Why use moderate or low heat for sponge cakes?

Calculate the cost of both sponge cakes and the number of people served by each.

Suggest a use for the yolks left from the white sponge cake.

Why are egg and white flour used in making corn bread?

Is there any objection to the use of griddlecakes?

Does the gingerbread brown more easily than the corn bread? Explain.

Calculate the cost of corn bread and of gingerbread for a family of six.

Compare the cost of sponge cakes and butter cakes.

Calculate the cost of pound cake. Is this expensive? Explain.

Calculate the cost of muffins for a family of six.

How may an oven that is too hot affect a cake mixture? too slow an oven?

Which needs the greater heat, a layer or loaf cake? a butter or sponge cake? a molasses or plain cake?

How determine when a cake is done?

When add beaten whites, and why?

Suggest possible causes for the following:

Cracks across top of cake in baking.

Coarse-grained cake.

Tough cake.

How prepare pans? Explain.

Suggest methods for reducing heat in an oven that is too hot.

How much should a cake increase in bulk while baking?

What effect has beating on the texture of the cake?

Why will a cake that is carelessly moved in baking frequently fall?

How care for a cake on removal from oven?
Discuss order of adding ingredients in mixing a cake.
When add flour? When add eggs? Explain.

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CHAPTER XIX

BREAD

Bread is a dough made of flour, salt, liquid, and yeast. The flour of wheat is used more commonly than that of any other cereal. The flavor of wheat is desirable, and its gluten makes it suitable for bread. If the whole kernel is ground, as in graham flour, the flavor is very pronounced; if less of the bran is retained, as in whole-wheat flour, the flavor is milder. The range of flavor in the ordinary white flours of the same grade is not so great, but there is a choice.

It was discovered long ago that a dough, or mixture of flour and water, would undergo some changes on standing, and the character of the loaf on baking was consequently different. This change we know to be fermentation, due to the development of certain living forms in the dough. Instead of depending upon chance for these living forms to make the dough light, we add yeast to the dough at the start. The yeast is a one-celled plant of microscopic size. Like any other plant, the yeast requires the proper conditions for growth — namely, warmth, moisture, and food. These favorable conditions are found in bread dough, and as the yeast grows there is developed carbon dioxide, which gas lightens the dough.

Yeast may be purchased in the form of dry cakes, or as compressed yeast. Frequently these are used to make a so-called "starter," which is kept and used from time to

time in the household. The starter, or liquid yeast, affords a favorable place for the growth of other living forms than yeast, and these often are the cause of sourness or a very poor flavor in the bread. Since the same conditions which favor the growth of yeast favor the growth of other plants, it is very necessary to be careful that all the materials are in good condition and that all the utensils are clean. The amount and the condition of the yeast used in making bread determine the time necessary for the process. The yeast

Typical Loaves of Bread

plant develops very rapidly if under favorable conditions and will leaven a large amount of dough in a comparatively short time. If it is necessary to make the bread in a very short time, as much as two cakes of compressed yeast may be added to a small loaf without injuring the flavor of the bread. In the ordinary household process such an amount would be unnecessary and extravagant, except under unusual circumstances. Bread made in a short time with compressed yeast is familiarly known as "short process" bread. The more common custom is to allow a longer time for making bread. The yeast is mixed with a small portion of flour

and water. Sugar is usually added to this mixture, and oftentimes potatoes are used. This mixture is known as a sponge and affords favorable conditions for the development of the yeast plant. The sponge stands for a number of hours (usually overnight) and is then mixed with more liquid and flour to make the dough. Bread made in this way is known as "long-process" bread.

UTENSILS USED IN BREAD MAKING, SHOWING ALSO METHOD OF MEASURING

The liquid used in making bread may be water, milk, a mixture of the two, whey, or potato water. Potatoes furnish a good medium for the growth of yeast, and so their use is frequently favored. Fat may or may not be added. Sugar, in small amount, hastens the activity of the yeast and should be added early in the process.

The object in kneading bread is to mix it thoroughly and to distribute the gas evenly, so making a finer texture. Repeated rising of the bread and kneading down before making into a loaf makes a somewhat finer texture and a

whiter loaf, but at the expense of the finer flavor of the bread. Very good bread can be made with comparatively little kneading.

Bread is baked to kill the yeast plant, to cook the starch thoroughly, and to make a brown and palatable crust. It is desirable to bake each loaf in a separate pan which is small enough to insure the thorough baking of the loaf. A small loaf of bread in a single pan should bake not less than forty-five minutes. If dough has doubled in bulk, it should be put into a very hot oven and the heat gradually reduced until the baking is finished. If the dough is put into the oven before its bulk has doubled, the heat should be more moderate at first in order that the loaf may rise sufficiently.

There are so many notions with regard to the desirable qualities of bread that it is a help to use some standard for judging it. The following score card, accredited to Miss Isabel Bevier at the University of Illinois, has been widely used and found helpful in establishing standards.

Bread Score Card

Scale of Points

Flavor	35
Lightness	15
Grain and Texture	20
Crust { Color, Depth, Texture }	10
Crumb { Color, Moisture }	10
Shape and Size	10
Total	100

1. The flavor is determined by taste and odor. Bread should have the good nutty sweet flavor of the grain. A sour or yeasty smell or taste is not allowable.

2. Lightness is determined by the relation of size and volume. The bread should be neither overlight nor underlight.

3. Grain and texture are judged by the fineness and tenderness of the loaf. There should be even distribution of the gas, making fine and uniform holes. No heavy streaks should occur.

4. The crust should be an even, yellowish brown in color, about one fourth of an inch in depth, and should be crisp.

5. The crumb should be creamy in color, neither excessively dry and crumbly nor doughy.

6. The loaf should be shapely and small enough to be thoroughly cooked.

LABORATORY EXERCISES

I. *Effect of Temperatures upon Yeast.* (Demonstration)

1. Blend one yeast cake thoroughly in a pint of water to which has been added 1 T sugar.

2. Freeze a portion of the mixture, and then allow it to thaw at room temperature.

3. Boil another portion and cool to room temperature.

4. Take another portion at room temperature.

5. Chill a fourth portion.

Fill wide-mouthed bottles from each of the above portions and invert them on plates. Keep 2, 3, and 4 in a warm room, and 5 packed in ice during the remainder of the laboratory period. Explain results observed.

II. *Long-Process Bread*

1 c boiled water *or*	1 T sugar
½ c each of milk and water	¾ t salt
⅙–¼ cake dry yeast *or*	1 T fat
⅛–⅙ cake compressed yeast	3 c flour

In making long-process bread less yeast is required than for the short process because the time is so much longer. Good long-process bread is made by different methods, but the following is typical.

A sponge is made by adding sugar, yeast, and flour to the liquid. Scald the liquid, and soften the yeast in 2 T warm water. When the liquid is lukewarm, add the yeast and sugar and enough flour to make a thin batter. This is set aside in a warm place overnight, during which time the yeast becomes active and the sponge is light. In the morning add all the other ingredients, mixing thoroughly. When enough flour is added so that the dough may be handled, turn it onto the board and knead until it is smooth, sticks neither to the board nor hands, and air bubbles appear near the surface of the dough. Put the dough into a greased bowl and set in a warm place. When the dough has doubled in bulk, make it into loaves and put into greased pans. Again set the dough to rise in a warm place. When the loaves have doubled in bulk, put into a hot oven and bake for from 40 to 50 minutes. The temperature of the oven should be lowered during the baking process. When the loaf is baked, remove it from the pan at once and cool it in a position which allows full circulation of air about the bread.

III. *Short-Process Bread*

½ c scalded milk	½ c boiled water
1 T lard or butter	¾ t salt
3 c flour	1 T sugar

1–2 compressed yeast cakes in 2 t warm water

Put butter or lard, sugar, and salt in bread bowl; pour on it the hot liquid (milk and water). When this is lukewarm, add the softened yeast cake; then add enough flour to make a stiff batter, beating thoroughly. Add the remaining flour; mix and turn onto the floured board. Knead until the dough will stick neither to hands nor to board and bubbles may be seen under the surface. Grease the bowl and return the dough to it. Set in a warm place until the dough has doubled in bulk; then shape into loaves. Let this double its bulk again and bake.

IV. *Whole-wheat, Graham, or Rye Bread*

Make a sponge as for long-process bread. When light, use entire-wheat, graham, or rye flour to make a soft dough. Make into loaves and let rise until thoroughly light. Bake with moderate heat 1 hour or longer. Sugar to sweeten may be added if desired.

V. *Parker House Rolls*

Roll bread dough to $\frac{1}{3}$ inch in thickness and cut with biscuit cutter. Crease each piece in the middle, brush one half with melted butter, fold, pressing edges together. Place in a greased pan, cover, let rise, and bake.

VI. *Cinnamon Rolls*

Roll bread dough to $\frac{1}{4}$ inch in thickness, spread with butter, and sprinkle with a mixture of $\frac{2}{3}$ sugar and $\frac{1}{3}$ cinnamon. Roll up like a jelly roll and cut into $\frac{3}{4}$-inch pieces. Place in greased pan flat side down. Let rise and bake.

GENERAL EXERCISES

Calculate cost of baker's bread per pound.
Calculate cost of homemade bread per pound.
Judge both samples by the score card.
Why is bread kneaded?
When is it desirable to use a sponge?

What determines the amount of yeast used?
What might cause sour bread?
What is accomplished in the baking of bread?
What is "jug" or "starter" yeast?
What kind of yeast would you use?
What is salt-rising bread?
Examine yeasts under the microscope, and make drawings.

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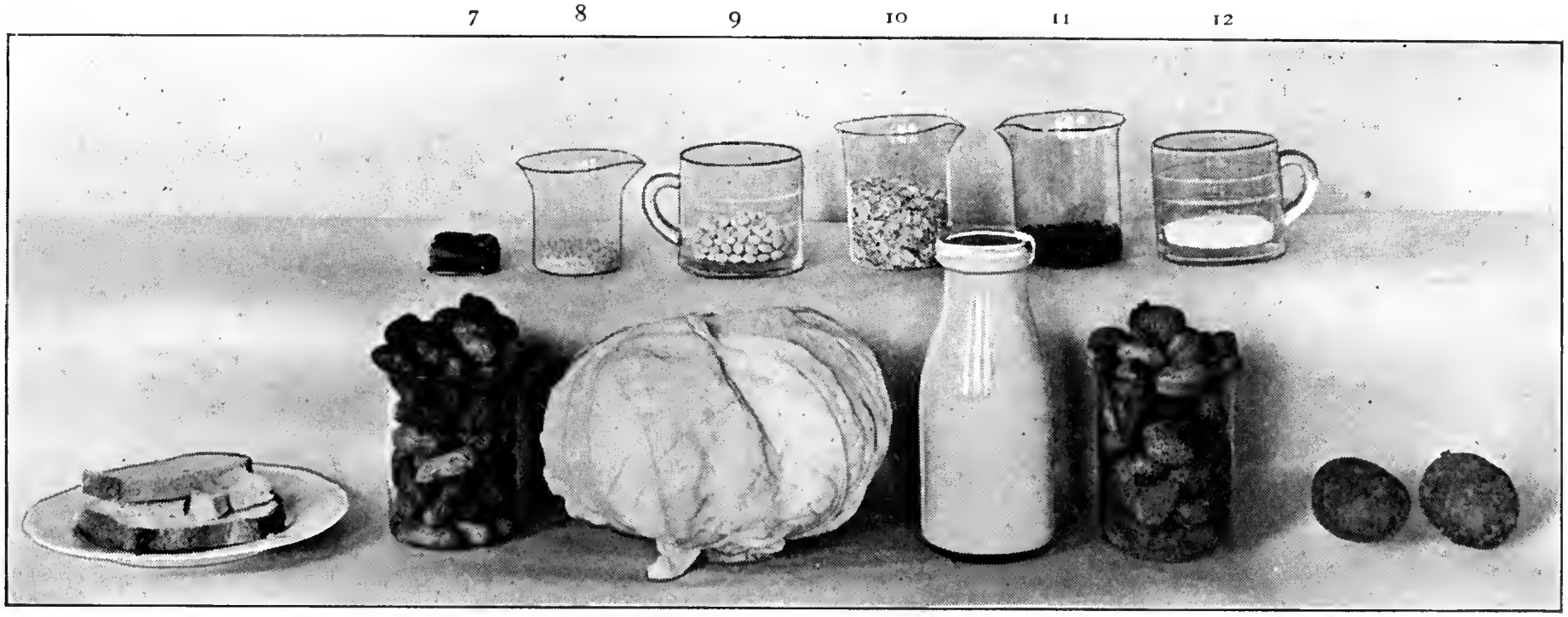
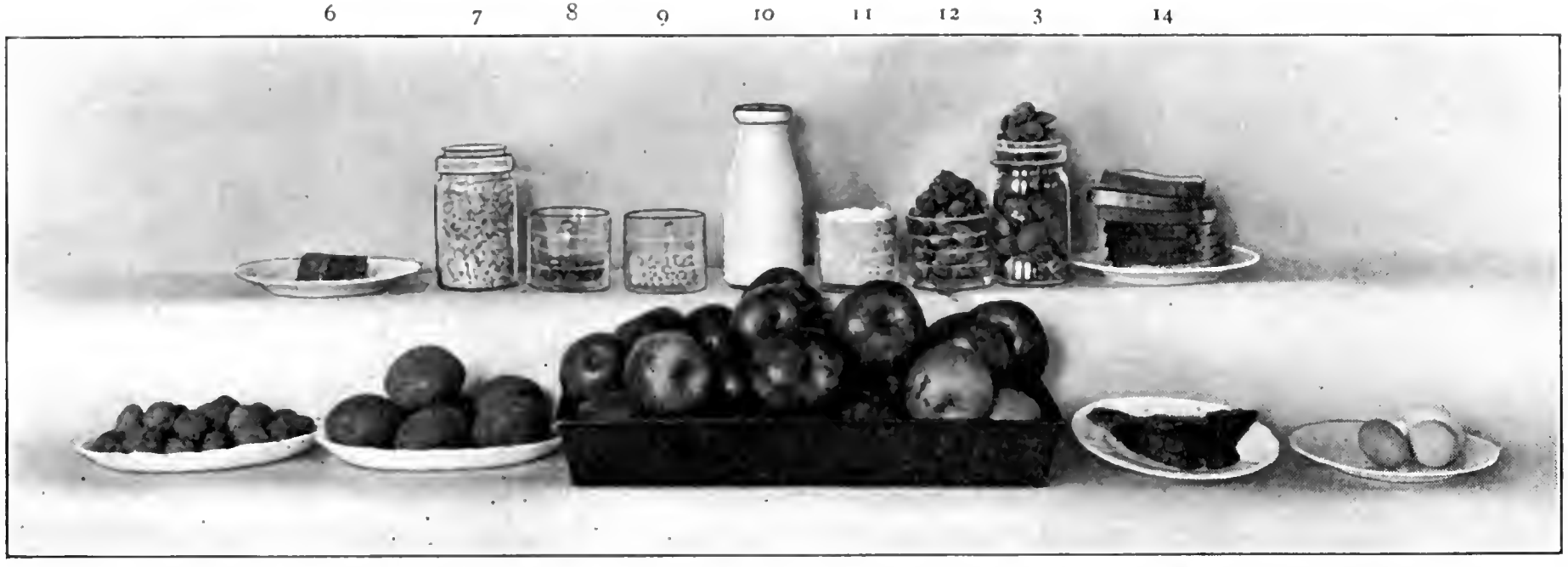


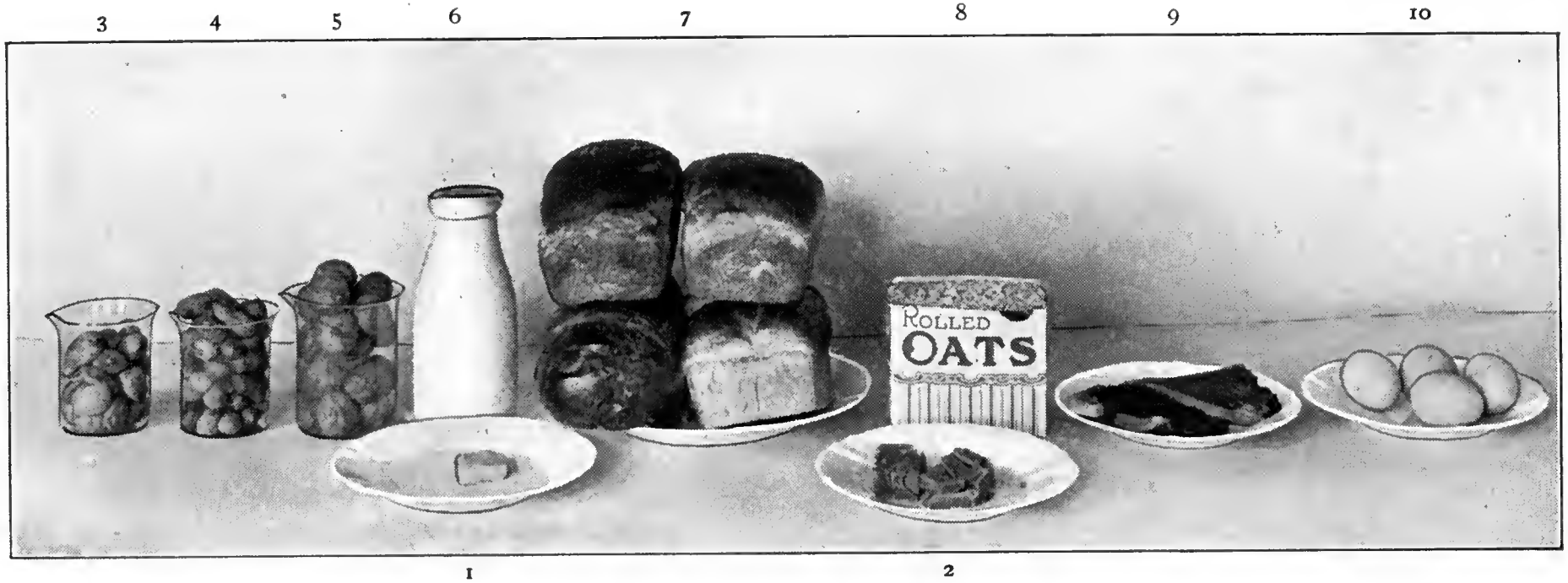
THE PORTIONS OF SOME COMMON FOODS WHICH CONTAIN THE SAME AMOUNT OF CARBOHYDRATE AS ONE PINT OF MILK (5%, 25 GRAMS)

	Foods	Weight		Measure		Foods	Weight		Measure
		Grams	*Pounds*				*Grams*	*Pounds*	
No. 1	Bread	47.08	.10	1¾ slices	No. 7	Figs	33.6	.07	1 fig
No. 2	Peanuts	135.1	.29	55 nuts, or 2 cups	No. 8	Rice	31.6	.07	⅛ cup
No. 3	Cabbage	520.	1.1	1 small head	No. 9	Beans	41.9	.09	⅓ cup
No. 4	**Milk**	**500.**	**1.1**	**1 pint**	No. 10	Rolled Oats	37.7	.07	¾ cup
No. 5	Almonds	263.1	.57	70 nuts	No. 11	Lentils	42.2	.09	¼ cup
No. 6	Potatoes	170.	.37	2 small potatoes	No. 12	Sugar	25.	.05	⅛ cup



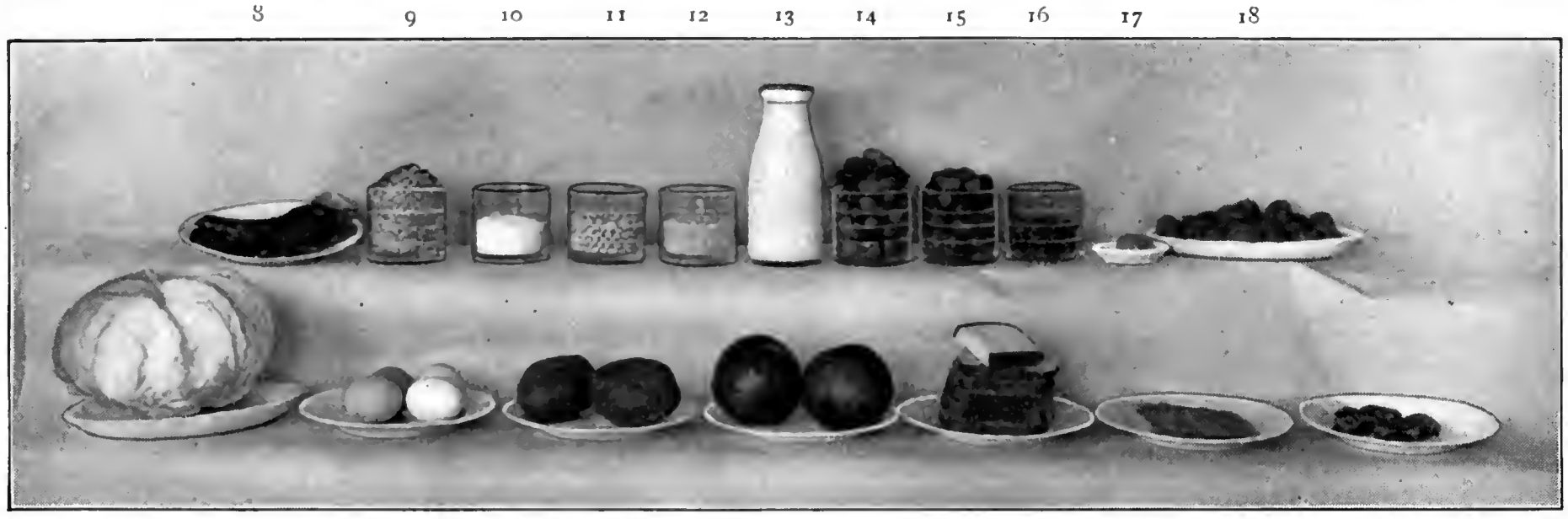
THE PORTIONS OF SOME COMMON FOODS WHICH CONTAIN THE SAME AMOUNT OF PROTEIN AS ONE PINT OF MILK (3.3%, 16.5 GRAMS)

	Foods	Weight		Measure		Foods	Weight		Measure
		Grams	*Pounds*				*Grams*	*Pounds*	
No. 1	Walnuts	239.1	.52	31 nuts	No. 8	Lentils	64.2	.14	⅓ cup
No. 2	Potatoes	916.6	2.01	6 medium	No. 9	Beans	73.3	.16	⅜ cup
No. 3	Apples	5500.	12.1	32, or ¼ bu.	**No. 10**	**Milk**	**500.**	**1.1**	**1 pint**
No. 4	Beef (round)	86.8	.19	1¼ servings	No. 11	Rice	206.2	.45	1 cup
No. 5	Eggs	138.	.3	3 eggs	No. 12	Peanuts	84.6	.18	32, or 1¼ cups
No. 6	Cheese	57.2	.13	2 sq. in.	No. 13	Almonds	143.4	.31	38 nuts
No. 7	Rolled Oats	98.8	.21	1½ cups	No. 14	Bread	179.3	.39	7 slices



THE PORTIONS OF SOME COMMON FOODS WHICH CONTAIN THE SAME AMOUNT OF FAT AS ONE PINT OF MILK (4%, 20 GRAMS)

	Foods	Weight		Measure		Foods	Weight		Measure
		Grams	*Pounds*				*Grams*	*Pounds*	
No. 1	Butter	23.5	.05	1½ T	**No. 6**	**Milk**	**500.**	**1.1**	**1 pint**
No. 2	Cheese	55.7	.12	2 sq. in.	No. 7	Bread	1539.	3.38	4 loaves
No. 3	Almonds	66.2	.14	20 nuts	No. 8	Rolled Oats	273.9	.6	⅔ box
No. 4	Peanuts	68.7	.15	29 nuts	No. 9	Beef (round)	156.2	.34	2 servings
No. 5	Walnuts	75.1	.16	12 nuts	No. 10	Eggs	215.	.47	4 medium



THE PORTIONS OF SOME COMMON FOODS WHICH HAVE THE SAME CALORIFIC, OR FUEL, VALUE AS ONE PINT OF MILK (346 CALORIES)

	Foods	Weight		Measure		Foods	Weight		Measure
		Grams	*Pounds*				*Grams*	*Pounds*	
No. 1	Cabbage	1300.7	2.8	1 head	No. 10	Sugar	86.5	.19	½ cup
No. 2	Eggs	252.	.55	4 eggs	No. 11	Beans	100.5	.22	½ cup
No. 3	Potatoes	516.4	1.1	2 large potatoes	No. 12	Rice	98.5	.21	½ cup
No. 4	Apples	736.1	1.6	2 large apples	**No. 13**	**Milk**	**500.**	**1.1**	**1 pint**
No. 5	Bread	133.07	.29	5½ slices	No. 14	Peanuts	83.5	.18	1½ cups
No. 6	Cheese	78.08	.17	3 sq. in.	No. 15	Almonds	97.1	.21	24 nuts
No. 7	Figs	109.1	.24	4 figs	No. 16	Lentils	99.2	.21	½ cup
No. 8	Beef (round)	180.9	.39	2½ servings	No. 17	Butter	44.9	.09	3 T
No. 9	Rolled Oats	87.1	.19	1⅓ cups	No. 18	Walnuts	200.9	.44	26 nuts

CHAPTER XX

FOOD REQUIREMENTS

In order to meet the needs of the human body, the diet should contain the various nutrients, or food principles, in proper amount and kind, and should furnish the necessary energy. Proteins, fats, and carbohydrates are all capable of furnishing energy, and so enable the body to perform its work — both internal and external — and keep it warm. Energy cannot be measured in terms of weight or of dimension but in terms of heat or of work performed. The unit of measure is the calorie, which is the amount of heat needed to raise one pound of water four degrees Fahrenheit, or the work necessary to raise one ton 1.53 feet. The calorific value of any substance is determined by burning a given weight in the calorimeter and determining the resulting heat. Protein and carbohydrate have about one half the calorific, or fuel, value of the same weight of fat. If the amount of protein, fat, and carbohydrate in the food is known, the fuel value of the diet may easily be calculated.

Many studies of food requirements have been made, and the results have led to the formation of so-called "standard dietaries." Observation of the food eaten by people under normal conditions has frequently been made and records kept of the food consumed. Since these earlier observations of food customs, or habits, very careful experiments have been conducted, investigating food requirements.

Dr. Langworthy, Chief of Nutrition Investigations, says that, for adults of moderate activity, the results "do not differ very markedly from a general average of 100 grams of protein and 3000 calories of energy, and that it is fair to say that, although foods may differ very decidedly, the nutritive value of the diet in different regions and under different circumstances is very much the same for a like amount of muscular work."

It is fairly easy to determine the need of the body for energy under given conditions, and to some extent fat, carbohydrate, and protein may replace each other for this purpose. Protein, it must be remembered, serves two purposes in the body; it builds and repairs tissue, and also furnishes energy. While it is necessary to supply enough protein to build tissue, it is desirable to depend quite largely upon the fat and carbohydrate for energy. If protein is eaten in too large amounts, it causes physiological disturbances and frequently makes an undue tax upon the body. In diseases, such as rheumatism and gout, the amount of protein eaten is restricted, and meat is frequently forbidden. There is a great difference of opinion among students of nutrition as to the desirable amount of protein in the diet.

The factors most affecting total food requirement are work, age, and size. In the adult, muscular exercise or work has the most important influence upon diet. The following estimates of the calorific need for the day are given by Atwater:

Man without muscular work	2700 calories
Man with light muscular work	3000 calories
Man with moderate muscular work . . .	3500 calories
Man at hard muscular work	4500 calories

Lumbermen who engage in very heavy work and in the open air have been known to use as much as 6000 calories and more.

"In general, it appears that the food requirements of men and women of equal activity are in proportion to their body weights. Women, on the average, weigh about 0.8 as much as men, and it is commonly assumed that if equally active their food requirements will stand in the same proportion. In apportioning the food of a family to its different members it has become customary to make use of some such conventional factors as the following:"

Under 1 year.	100 calories per kilogram
1–2 years	100–90 calories per kilogram
2–5 years	90–80 calories per kilogram
6–9 years	80–70 calories per kilogram
10–13 years	70–60 calories per kilogram
14–17 years	60–45 calories per kilogram

Sherman, "Chemistry of Food and Nutrition"

Von Noorden suggests for adults the following allowances:

At complete rest	30–35 calories per kilogram
With light exercise . . .	35–40 calories per kilogram
With moderate exercise . .	40–45 calories per kilogram
With hard muscular labor .	45–60 calories per kilogram

For the aged these figures should be lowered by one fourth. The higher calorific allowance for children is due to their great muscular activity, growth, and more intense physiological activities.

One-Hundred-Calorie Portions

It is frequently desirable to compare foods on the basis of fuel value, and the amounts of foods shown in the table on the following page will yield approximately one hundred calories. These amounts are frequently referred to as one-hundred-calorie portions.

The fuel value and composition of all ordinary foods may be determined by consulting "Chemical Composition of American Food Materials," *Bulletin No. 28*, Office of Experiment Stations.

Food for the Infant

For infants the only proper food is milk. If artificial feeding of an infant is necessary, a great responsibility rests upon the one who selects the food, for it is well known that the death rate is much higher where artificial feeding is employed. While the composition of milk is important, its cleanliness is a more vital factor. Ordinary milk contains enormous numbers of bacteria, and some of these may be dangerous. It is desirable to obtain a milk as free from germs as possible, and it becomes necessary to know the source and care of the milk supply. In the city market the milk is graded according to cleanliness. The cleanest, highest grade is known as certified milk, which sells from fourteen to sixteen cents a quart. Sometimes the price is even higher. Certified milk is used almost solely for infants and invalids. The next grade is known as inspected milk, and this is reasonably safe for ordinary use. For both certified and inspected milk, the cows are tested for tuberculosis, and all the conditions of production are watched.

One-Hundred-Calorie Portions

Food	Quantity	Constituents for which these are chiefly Valued
Almonds	12–15	Fat and protein
Apples	1–2	Carbohydrate, mineral matter, and bulk
Bacon	Small serving	Fat
Bananas	1	Carbohydrate
Beans (dried)	One serving (when cooked)	Protein and carbohydrate
Beef (round)	Small serving ($1\frac{1}{2}$ in. sq.)	Protein and fat
Bread	1 slice	Carbohydrate and protein
Butter	1 square or ball	Fat
Cabbage	$\frac{1}{4}$ small head	Bulk and carbohydrate
Cheese	Small cube ($1\frac{1}{2}$ inches)	Protein and fat
Chocolate (bitter)	$\frac{1}{2}$ square	Fat
Corn meal	$\frac{1}{8}$ cup	Protein and fat
Cream	$\frac{1}{3}$–$\frac{1}{4}$ cup	Fat
Dates	3–4	Carbohydrate
Eggs	1	Protein, fat, and mineral matter
Milk	$\frac{3}{4}$ cup	Protein, fat, carbohydrate, and mineral matter
Oatmeal	$\frac{1}{2}$ cup (cooked)	Carbohydrate, mineral matter, and bulk
Olives	7–8	Fat
Oranges	1 large	Mineral matter and carbohydrate
Pickles	15 cucumbers (medium sized)	Flavor
Pork chops	1 very small	Fat and protein
Potatoes	2 small	Carbohydrate and bulk
Prunes	3–4	Carbohydrate
Raisins	15–20	Carbohydrate
Rice	$\frac{1}{8}$ cup (dry)	Carbohydrate
Sugar	2 tablespoons	Carbohydrate
Tomatoes (canned)	about 1 pint	Flavor

The third grade is known as market milk and is much less rigidly inspected. This grading of milk is a good illustration of the fact that cleanliness costs money. For the feeding of infants the very best milk should be used. This is frequently modified to suit the age and needs of the infant by changing its composition. Water, milk sugar, and cream are very commonly added to cow's milk.

Frequent attempts have been made to prepare artificial foods for infants, and many are found on the market. Some of these manufactured foods are lacking in mineral salts and some contain starch — a carbohydrate which does not occur in milk and which is entirely unsuited to a young infant. In general, the proportion and nature of the nutrients differ from those of milk and frequently they are not good substitutes for milk. Many times children apparently thrive on these prepared foods, but usually they are large and flabby, and have less ability to resist disease than normally fed children. Whether the food of an infant is natural or artificial, it should be given with great regularity.

During the second year solid food may be introduced into a child's diet, but great care should be used in its selection. Milk will still be the basis of the diet, and suitable materials may be added, such as a soft-poached egg, thoroughly dried and toasted bread, orange juice, baked apple, thoroughly cooked prunes, and cereals, junket, and rice pudding. Sugar should be used very sparingly, and should not be permitted with the cereal or fruit, for the sugar habit is easily formed, and the easiest way to avoid its overuse by the child is not to use it the first time. Only the pulp of the fruit should be used, and if the cereal is coarse, it may be put through a strainer to remove a portion

of the cellulose. During the second year the food should be given in four or five meals at regular intervals. The second year of a child's life is an important one for its future welfare. Many of the health disturbances arise from improper food. The fact that some children thrive in spite of being improperly fed is no reason for taking the risk with other children.

After the second year fruits and vegetables may be supplied in greater variety, but meat should be sparingly used for the first eight years. Eggs, milk, bread, and cereals, with fruits and vegetables, should make up the bulk of a child's diet. Sugar should be added to the diet with some care. It is better given at the end of the meal in a simple dessert, such as rice pudding, custard, figs, raisins, or occasionally a wholesome homemade candy. Sugar is used to excess usually with the cereal, fruit, and beverages, and these food habits should never be formed. Tea and coffee should never be given to a child, but the habit of drinking water should be encouraged. With thought and tact on the part of older people, the child will develop a liking for most ordinary, plain foods. All fancy and rich made dishes, especially those which are highly flavored, should be rigidly excluded from the meals of a child.

The importance of proper food for the child in school is recognized more and more, as is shown by the action of school authorities and other interested parties in providing food at school. Frequently, as a result, better health follows, better order is found in the schoolroom, and lessons are better learned. Food, especially when eaten in the middle of the study period of the day, should be light and easy of digestion. Eggs and milk will be a safe foundation and

should be used more generously than meat. The pennies of school children are most commonly spent for candy and pickles. It is better to include in the meal some wholesome sweet and acid so that the craving for these things is satisfied. Figs, dates, and raisins are desirable sweets for a child's lunch. Ice cream, if wholesome, is a valuable food, but that obtained from street venders is so frequently bad that it is dangerous to buy it. If the lunch is served at school, milk, soups, and cocoa or plain milk with crackers are good. Fresh and stewed fruits and vegetables should be liberally used. Good bread and butter is always desirable. Cookies, gingerbread, sponge cakes, and other mixtures which are not rich may well be included in the meals of children to supply variety and attractiveness.

GENERAL EXERCISES

Using the table for one-hundred-calorie portions, plan the three meals of a day which will have a total fuel value of 2500 calories.

Estimate the calorific value of an ordinary breakfast.

Using the tables given in this chapter, plan a day's meals for a man who is digging a ditch or sawing wood; a day's meals for a bookkeeper. The weight of both men is assumed to be 175 pounds.

Plan one week's suitable noon lunches for a child in school.

Test for starch several samples of prepared infant's food. How is this done?

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CHAPTER XXI

SELECTION OF FOOD

A few generations ago, when people produced much of their own food and transportation facilities were not so well developed, the variety of food at hand was not so great as now, and the possibilities of choice were not so many or so confusing. The choice of food for human beings is a real responsibility and should be more clearly recognized. Unfortunately, appetite is not always a safe guide, for food habits are rather easily formed, and an abnormal appetite is as easily and quickly formed as a normal, or correct, one. Appetite, or food habit, may lead to the eating of too much as well as to the eating of too little food. Both overnutrition and undernutrition may be commonly observed in people, due not only to too much or too little food eaten, but to food that is not wisely chosen. The only remedy for bad food habits is some real knowledge of the value of foods, as well as a knowledge of the individuals who are to eat them. At the present time any progressive stockman or farmer can tell what kind and amount of food is being given to the calf or the pig, but not many women in the same families have an equal knowledge of the food which is being given to the children, or to the grown-up members of the family. Mrs. Richards says, "Not all other influences put together can equal in profound effect upon the welfare of the

household that exercised by food and the attitude of mind regarding it." Sugar is more nearly chemically pure than any of our ordinary food products; starch is practically pure carbohydrate, but most all of our common food materials contain two or more nutrients or food principles, and a knowledge of the composition is necessary to a wise choice of foods.

It is not only desirable that a person cultivate a liking, or taste, for all ordinary foods, but it is really a duty. In many cases so-called dislikes are only mistaken notions, and indicate bad food habits or poorly prepared food. Criticism of food at the table is not desirable and should never occur, as this is a strong influence in forming fancied dislikes and cultivating bad food habits.

In the ordinary family there are both children and adults, and the differences in their need of food should be borne in mind. Certain peculiarities or abnormal conditions may need to be considered in connection with the individual. There should be a wide difference between the food of an infant and an adult, and errors in the nutrition of the infant and the growing child may affect the health in later years.

To properly select food, its chemical composition must be understood and interpreted in the terms of nutrients, or food principles — water, mineral matter, protein, carbohydrate, and fat. "Chemical Composition of American Food Materials," *Bulletin No. 28*, gives the composition of all our ordinary foods. The figures cannot be remembered, but it is not too much to ask that the one who selects food should have in mind the general composition of the food materials.

The table below suggests the nutrients for which some common foods are especially valued.

Protein	Fat	Carbohydrate	Mineral Content
Meat	Butter	Sugar	Green vegetables
Eggs	Cream	Starch	Fruits
Milk	Bacon	Bread	Eggs
Cheese	Cheese	Cereals	Milk
Legumes	Nuts	Dried fruits	
Nuts	Fat meat	Rice	
Fish		Potatoes	
		Macaroni	
		Hominy	
		Tapioca	
		Dried beans	

It is not often that we select foods because of a high water content, for water is so easily obtainable elsewhere, but the following foods contain a large amount of water: milk, green vegetables (such as celery, lettuce, cabbage, cucumbers, and tomatoes), fresh fruits, and shell fish (such as oysters and clams).

Oatmeal, graham flour, green vegetables, and fruits furnish bulk to the diet.

Cost is a very real factor in selecting food, but it is not always properly considered. A cheap food is one which contains a large amount of nutritive material for a given sum of money — not necessarily one of low money cost. Cost is in no way a measure of the value of a food. Rarity, flavor, distance from market, season, and other factors enter into the money cost. Generally speaking, meats, dairy products, and vegetables and fruits out of season are high-priced foods. Plant foods, as a whole, are cheaper

than animal foods; the cheapest foods are the cereals and legumes. The cost of fuel for cooking any food must be added to the cost of the raw material. Sometimes a saving in the cost of food may be made by buying in large quantity and storing.

Planning Meals

Since so many factors enter into the wise selection of food, the planning of meals should be a subject for study. The housekeeper who carefully plans the meals for several days, or at least one day, in advance is able to select more wisely, buy more advantageously, secure more pleasing meals, and do it with less friction than the one who does not. Such a woman is in sharp contrast to the one who goes into the kitchen shortly before a meal, finds a lack of the things wanted, and starts the children in hurried trips to the store for the first article of food which comes to her mind as one that can be quickly prepared. The dropping of this careless habit would be much appreciated by the grocer, as well as by the members of the household.

In planning meals the tastes of the family should be taken into account to a certain extent. Real likes and dislikes should be carefully distinguished from whimsical notions. In every case the food should be so prepared and served that it is pleasing both in flavor and appearance. Monotony in meals is not necessary and indicates lack of thought and care. Variety in food has both a psychological and a physiological value. This may be obtained by using different foods or by using different methods for preparing and serving the same food. Meat and potatoes, for instance, need not always be fried.

A knowledge of the composition of food will prevent the serving of too many starchy foods at one meal, such as rice and potatoes, or macaroni and bread pudding; or too many foods high in protein, as meat and cheese or legumes.

Foods should be combined for a meal not only on the basis of composition, but with regard to flavor. Too many acid, sweet, or strong-flavored foods should not be combined in one meal, and should bear a proper relation to one another.

Experience shows that dishes of somewhat different character are chosen for the three meals of the day. Americans are tending toward the simple European breakfast of rolls or toast and coffee, although fruit, cereals, and sometimes a hot dish of some sort is added. The heavy meal of the day is dinner, whether served at noon or at night. In addition to the meat course, a salad course and a dessert course are often served. Frequently a soup course precedes the meat course. The soup and salad courses are sometimes omitted. The luncheon or supper is a lighter meal.

In planning meals the amount of labor involved in preparing the food should be taken into account.

After food is wisely chosen, well prepared, and properly combined for a meal, some thought should be spent on its serving, for this may either add to or detract from the meal.

GENERAL EXERCISES

Make a list of dishes suitable for the three meals of the day.

Suggest the more expensive dishes which appear in this list.

Suggest the dishes on this list which require a long time in preparation.

Plan meals for a day which will be low in cost; medium in cost; high in cost. Discuss and criticize.

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CHAPTER XXII

SERVING MEALS

The dining room should be cleaned, *aired*, and in order. The linen should be as good as possible and carefully laundered, and the silver should be kept in good condition.

Directions for Setting the Table

If tablecloth is to be used, cover table first with silence cloth for protection, then put on tablecloth with middle fold in center of table. On tables of handsome wood, luncheon is often served without a cloth, individual doilies being used under all the dishes.

A "cover" is a place at table for each person and should consist of plate, napkin, glass, knives, forks, and spoons necessary for the meal. Twenty inches of space is the least that should be allowed for each cover; and on formal occasions 30 inches should be given. The depth of cover is from 15 to 16 inches.

Knives are placed at the right of the plate and about $\frac{1}{2}$ inch from the edge of the table with the cutting edge turned toward the plate. If more than one knife is used, lay the last one to be used nearest the plate, the first knife to be used farthest from the plate, and the others in order of using. At the right of the knife or knives lay spoons with bowls up, in order of using. On formal occasions

when a number are required they may be laid by the plate at the time of serving the course for which they are needed.

Forks are placed, tines up, at the left of plate in the order of using, except the oyster fork, which is placed at right of spoons.

The napkin is folded and laid at the left of the forks, or in the center of the place.

The glass should be three quarters filled with water and placed at the right of cover, just above the point of the knife.

The bread-and-butter plate is at the left above the forks.

Individual salts and peppers are placed in front of each cover, or salt and pepper shakers may be placed between each two covers or at corners of the table.

Directions for Serving

Trays are used to carry silver, small dishes, and those dishes on which fingers are apt to come in contact with the food. Large dishes are sometimes more easily carried on a folded napkin.

Be sure that hot dishes are served *hot* and cold dishes *cold.*

Dishes from which portions are to be taken should be passed to the left.

Dishes containing only individual portions are placed at the right with the right hand.

When a course is removed, take first all large dishes containing food, then all soiled china, glass, and silver, then clean glass, silver, and china, and all things pertaining only to that course. Never pile dishes on one another. One may be removed in each hand or small pieces may be set

beside one another on a tray. Take the plates and other dishes from the right side of the cover.

Crumbs are removed before the dessert course and between other courses if necessary. A clean napkin and plate are satisfactory for this purpose.

The waitress should see that glasses are kept filled, butter, bread, and rolls always supplied without being asked for, and other things at hand as needed.

Remove every soiled dish from the table as soon as the purpose which it has served is over. Move noiselessly and avoid all clatter of dishes.

In serving begin with hostess or guest of honor (the lady at the right of the host) and pass to the other guests in order.

GENERAL EXERCISES

1. From a given list of materials, such as the following, plan and prepare a meal for one person. Select either Group I or Group II and use any desired materials from the Common Supplies.

Group I	Group II	Common Supplies	
1 potato	Rice or macaroni	Ice	Flour
1 egg	1 egg	Butter	½ c tomato
½ c milk	½ c milk	Bread	Gelatin
Salmon	Cheese	Vinegar	Flavoring
Orange or	Pineapple or	Lemon	Lettuce
Canned fruit	Canned fruit	Sugar	

Serve appropriately. Compare the meals as to originality, desirability, and attractiveness of service.

2. Plan the three meals of the day for six persons at a cost of $1.80, or 30 cents each.

Make and hand in the order list.

Prepare and serve the meals. Score according to meal score card in the Appendix.

Tabulate, in form similar to the one indicated below, the amount and cost of materials used.

Foods	Amount	Cost

Calculate the cost of fuel used in preparation of the above meals, and the cost of labor at ten cents per hour.

What is the total cost of the meals of the day?

APPENDIX I

Food Standards

The fact that poorly prepared food is often found suggests the need of better standards. It is easy and natural to like the things to which we are accustomed, and oftentimes a family is found which is fond of its own particular kind of sour bread, or its hard-fried, leathery beefsteak. Comparison is one of the best means of setting a good standard, and the score card affords a ready means of emphasizing the good or bad points of an article. The following score cards have been found useful, and others could be easily formulated.

Bread[1] (White, Salt-rising, Rye, Graham)

Flavor	35
Lightness	15
Grain and Texture	20
Crust	
Color, Depth, Texture	10
Crumb	
Color, Moisture	10
Shape and Size	10
	100

[1] Illinois score card for bread. — Bevier.

Steamed Brown Bread and Corn Bread

Flavor	40
Lightness	15
Texture	20
Crust	10
Appearance	15
	100

Loaf Cakes

Flavor	35
Lightness	15
Texture	20
Crust	10
Appearance	
Shape, Size Color of Crust Icing	20
	100

Layer Cakes

Flavor	30
Lightness	15
Texture	20
Icing	20
Appearance	15
	100

Cookies, Doughnuts, and Fancy Cakes

Flavor	40
Lightness	15
Texture	20
Appearance	
Form Size, etc. Additions	25
	100

Pies

Flavor	40
Crust	
Flakiness, Tenderness	40
Appearance	20
	100

Candy

Flavor	50
Texture	30
Appearance	20
	100

Canned Fruit

Flavor	60
Color	15
Condition of Fruit	15
Consistency of Sirup	10
	100

Jelly

Flavor	50
Color	15
Consistency	20
Texture	15
	100

Preserves

Flavor	50
Color	15
Consistency of Sirup	20
Condition of Fruit	15
	100

Pickles, Catsup, etc.

Flavor	60
Condition	25
Color	15
	100

Fruit Butter and Marmalade

Flavor	60
Consistency	25
Color	15
	100

Score Card for a Meal

Selection of food	
Quality of materials, Combination of nutrients, Combination of flavors, Variety and suitability	40
Preparation of food	35
Service	
Table appointments, Attractiveness of food, Table service	25
	100

Contests

The contest may be a valuable means of making comparisons and forming standards. A bread-judging contest is frequently arranged for a class or a club, in which a number of loaves of bread are judged, according to the score card, by the contestants. Other contests could easily be arranged in the same way.

APPENDIX II

Retail Cuts of Beef

[Reprint from *Bulletin No. 158*, University of Illinois, Agricultural Experiment Station, by L. D. Hall and A. D. Emmett, to be used in connection with their photographs of retail cuts]

Taking the net cost of the lean meat as a basis of comparison, we learn from these data that the most expensive steaks at the prices given are the porterhouse cuts, followed by the club, sirloin, flank, round, and chuck steaks. Of the different roasts the first-cut prime ribs are the most costly in terms of lean meat, and the rump roast is the most economical. The various boiling and stewing pieces furnish lean meat more economically at market prices than either the roasts or steaks; the rib ends and briskets being the dearer cuts of this class, while the neck and shank stews are relatively cheapest. Several of the soup bones are very economical sources of lean meat, particularly the middle cuts of both shanks; and only one of them is extremely expensive, even on this basis. In general, the wide variation between the various cuts in net cost of lean is remarkable, ranging from 7.5 cents in one of the soup bones to 40.5 cents in a prime rib roast, and up to 62.5 cents in the hock soup bone; the latter, however, being used primarily for its flavoring substance rather than for lean meat. It will be observed, also, that the market prices of the cheaper cuts correspond much more closely to their net cost of lean meat than is true of the higher-priced steaks and roasts.

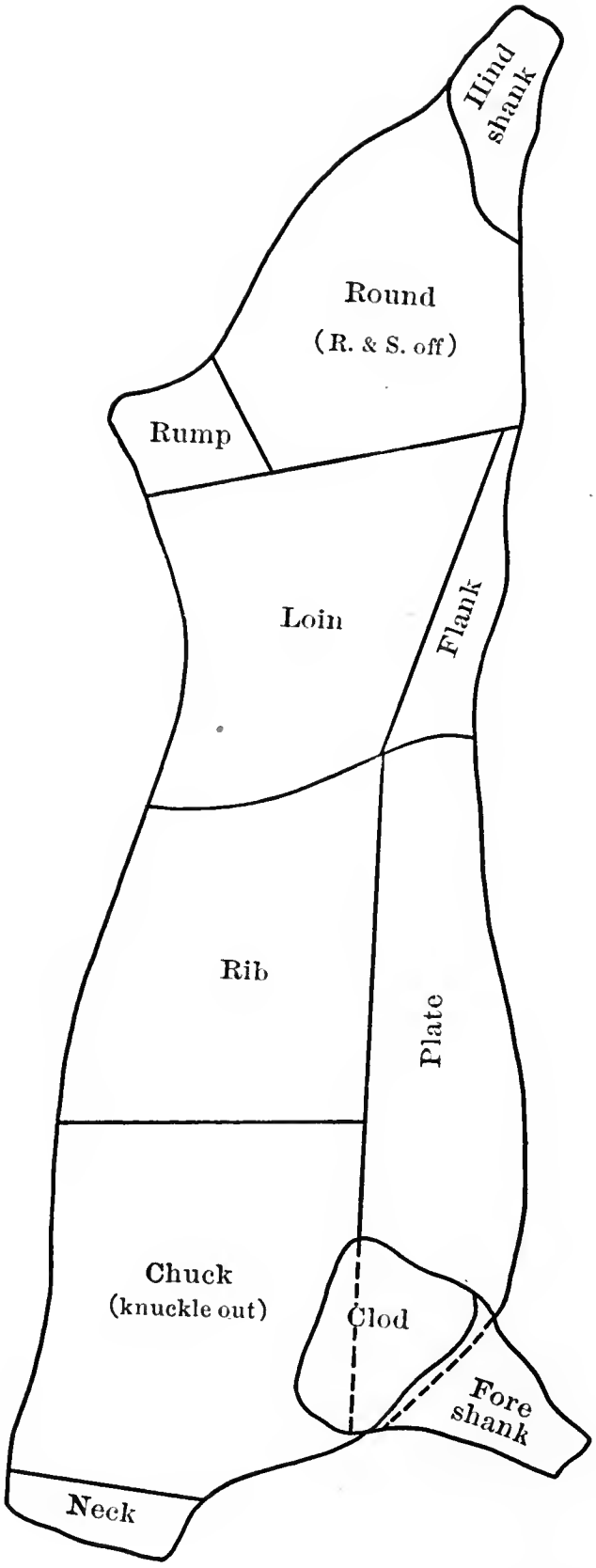
The net cost per pound of gross meat, or lean and fat combined, varies much less as between the different cuts than does the net cost per pound of lean, because the proportions of total meat are more nearly uniform than the percentages of lean.

The various steaks and roasts rank in substantially the same order as to relative economy on this basis as on the basis of lean meat. The rib roasts, however, are considerably more economical as compared with the porterhouse and sirloin steaks when all the edible meat is considered. The rump shows a very low cost per pound of edible meat, due to the large proportion of fat it contains; and a still further difference is noticed in the case of the rib ends, brisket, navel, flank, neck, and several of the soup-bone cuts. The stewing meats are generally the most economical sources of edible meat at these prices, while porterhouse steaks are the most expensive.

On the whole, the data clearly show that the cheaper cuts of beef are by far the most economical sources both of lean and of total edible meat, including fat and lean. It has been shown that no correlation exists between market prices and the proportion of flavoring substances contained in various portions of the carcass; and cooking tests indicate that the proportion of waste and shrinkage is not necessarily greater in the cheaper than in the more expensive cuts. It is evident, therefore, that retail prices of beef cuts are determined chiefly by considerations other than their food value, such as tenderness, grain, color, general appearance, and convenience of cooking.

Cost of Lean and of Total Meat in the Various Retail Cuts at Market Prices

Retail Cuts	Diagram Number (Page 147)	Retail Price (in Cents) per Pound of Cut	Cost (in Cents) per Pound of Lean Meat in Cut	Cost (in Cents) per Pound of Lean and Fat Meat in Cut
Steaks				
Porterhouse, hip-bone	8	25	38.6	28.9
Porterhouse, regular	10	25	40.2	27.2
Club steak	18	20	32.1	22.6
Sirloin, butt-end	1	20	25.3	20.6
Sirloin, round-bone	3	20	28.3	21.1
Sirloin, double-bone	5	20	28.7	22.7
Sirloin, hip-bone	7	20	32.3	24.2
Flank steak	1	16	19.3	16.0
Round, first cut	2	15	17.0	15.3
Round, middle cut	6	15	17.3	15.6
Round, last cut	14	15	19.3	16.0
Chuck, first cut	2	12	18.3	14.1
Chuck, last cut	9	12	15.7	13.1
Roasts				
Prime ribs, first cut	1	20	40.5	22.9
Prime ribs, last cut	4	16	26.1	18.8
Chuck, fifth rib	1	15	22.8	17.3
Rump	1	12	19.4	12.8
Boiling and stewing pieces				
Round pot roast	16	10	11.6	10.1
Shoulder clod	14	10	12.3	10.5
Shoulder pot roast	11	10	14.3	11.6
Rib ends	3	8	16.2	9.2
Brisket	1	8	15.0	8.7
Navel	2	7	12.8	7.7
Flank stew	2	7	10.9	7.1
Fore shank stew	1	7	8.5	7.0
Neck	15	6	8.5	7.0
Soup bones				
Round, knuckle	2	5	26.3	12.5
Hind shank, middle cut	18	5	7.5	6.3
Hind shank, hock	19	5	62.5	26.6
Fore shank, knuckle	2	5	17.2	12.5
Fore shank, middle cut	4	5	12.5	9.4
Fore shank, end	6	5	28.8	20.9



HIND QUARTER

Round
- Rump
- Round with rump and shank off
- Hind shank

Loin

Flank

FORE QUARTER

Rib

Chuck
- Chuck, knuckle out
- Clod
- Neck

Plate

Shank

METHOD OF CUTTING THE THREE SIDES, SHOWING WHOLESALE CUTS

Hind Quarter

Round

Rump

1, rump

Round with rump and shank off

2, round steak, first cut
3–13, round steaks
14, round steak, last cut
15, knuckle soup bone
16, pot roast

Hind shank

17, 18, soup bones
19, hock soup bone

Loin

1, butt-end sirloin steak
2, wedge-bone sirloin steak
3, 4, round-bone sirloin steak
5, 6, double-bone sirloin steak
7, hip-bone sirloin steak
8, hip-bone porterhouse steak
9–15, regular porterhouse steak
16–18, club steaks

Flank

1, flank steak
2, stew

Fore Quarter

Rib

1, 11th and 12th rib roast
2, 9th and 10th rib roast
3, 7th and 8th rib roast
4, 6th rib roast

Chuck

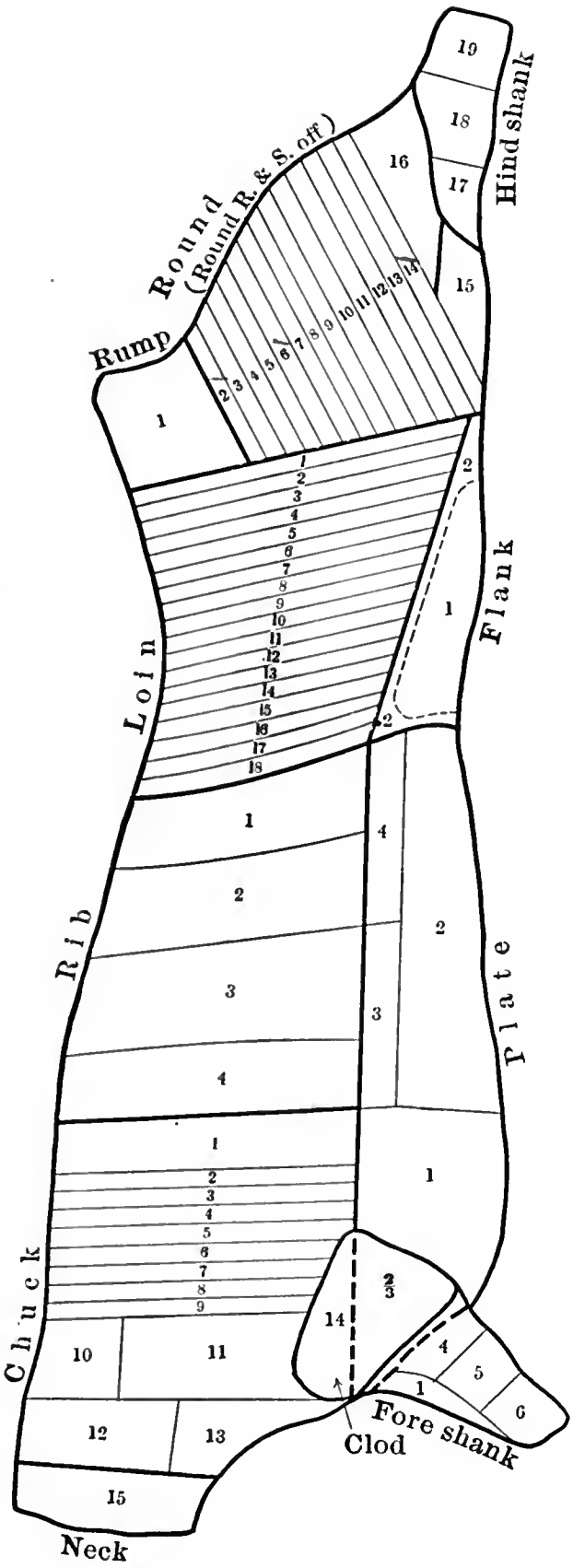
1, 5th rib roast
2–9, chuck steaks
10–13, pot roasts
14, clod
15, neck

Plate

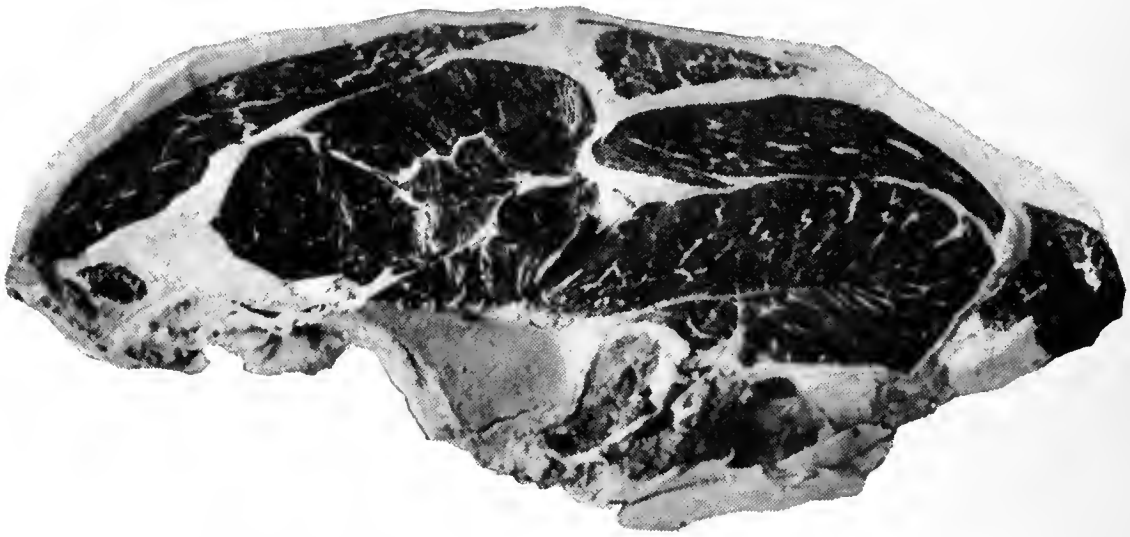
1, brisket
2, navel
3, 4, rib ends

Fore shank

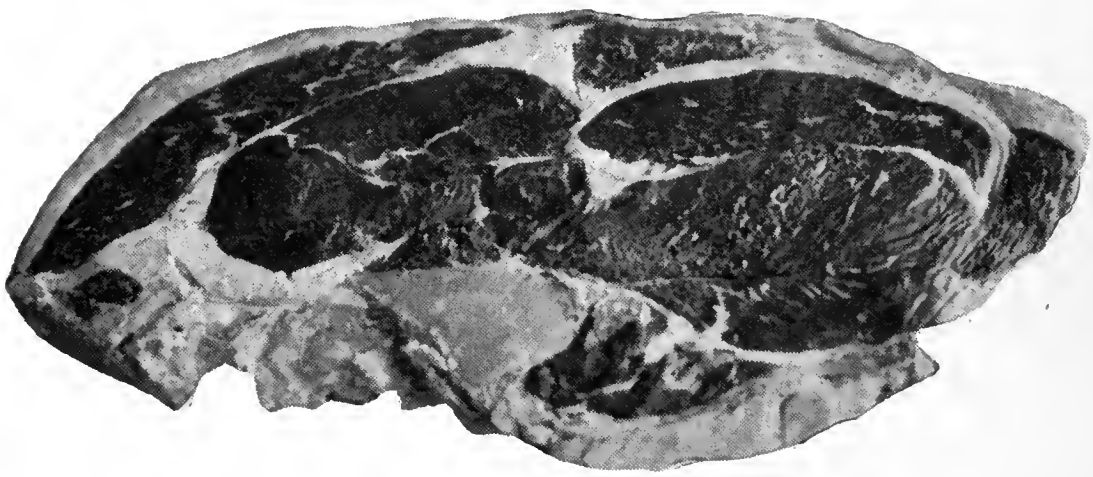
1, stew
2, knuckle soup bone
3–6, soup bones



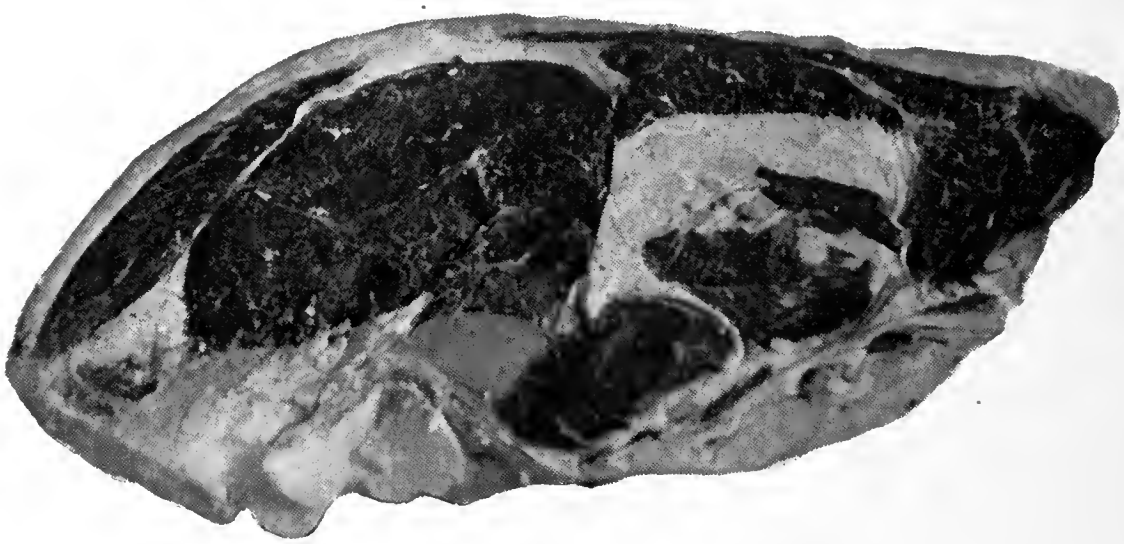
Method of cutting the Three Sides, showing Retail Cuts



First Cut Sirloin Steak. Loin Cut No. 1

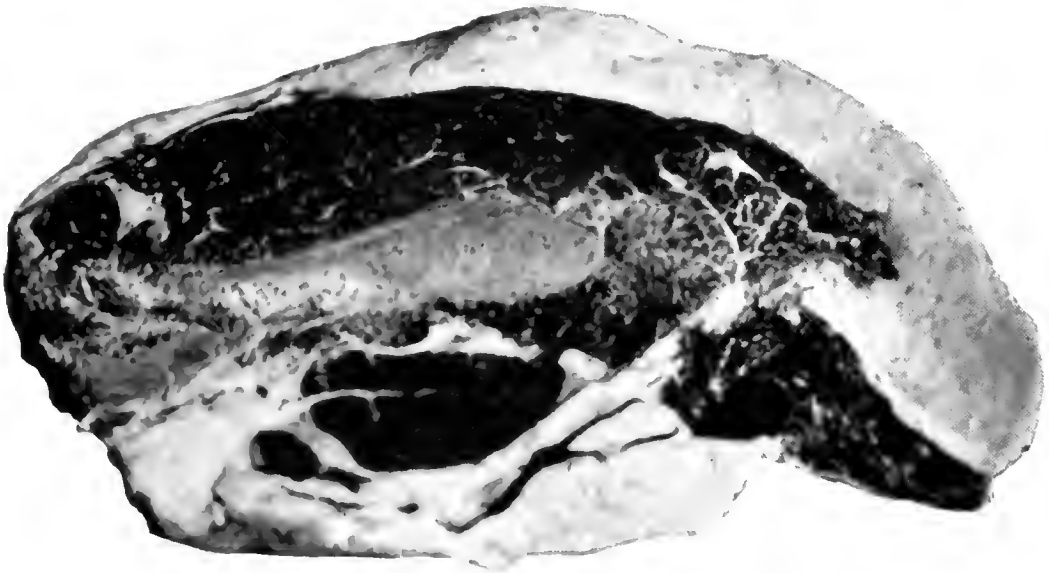


Wedge-Bone Sirloin Steak. Loin Cut No. 2

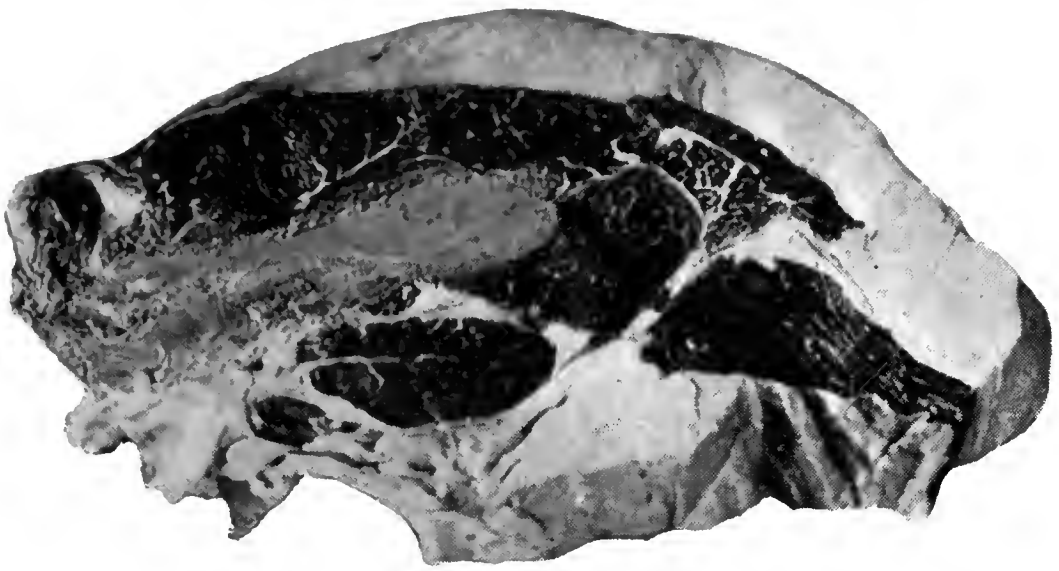


Round-Bone Sirloin Steak. Loin Cut No. 3

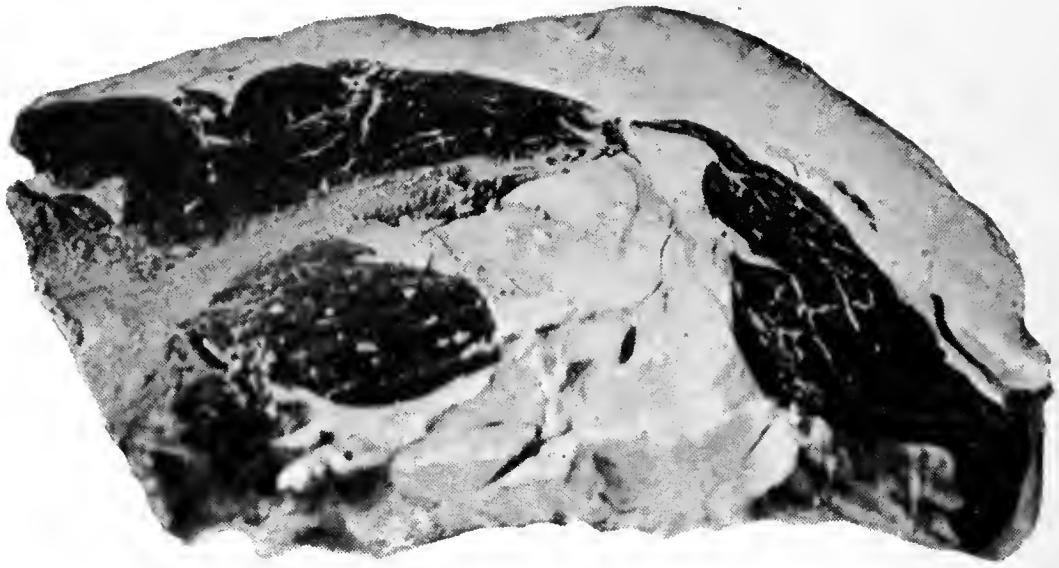
ROUND-BONE SIRLOIN STEAK. LOIN CUT NO. 4



DOUBLE-BONE SIRLOIN STEAK. LOIN CUT NO. 5

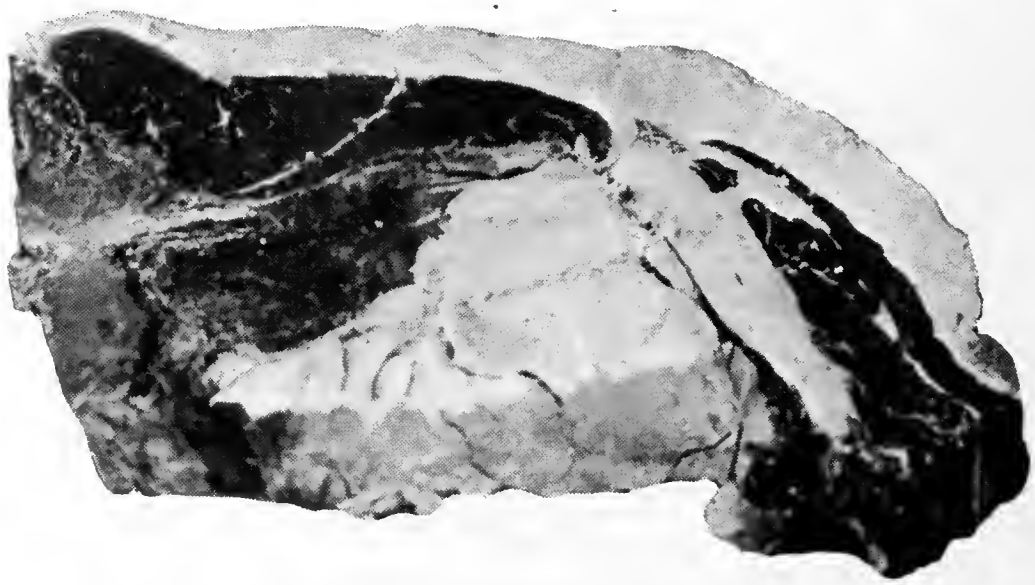


HIP-BONE SIRLOIN STEAK. LOIN CUT NO. 7

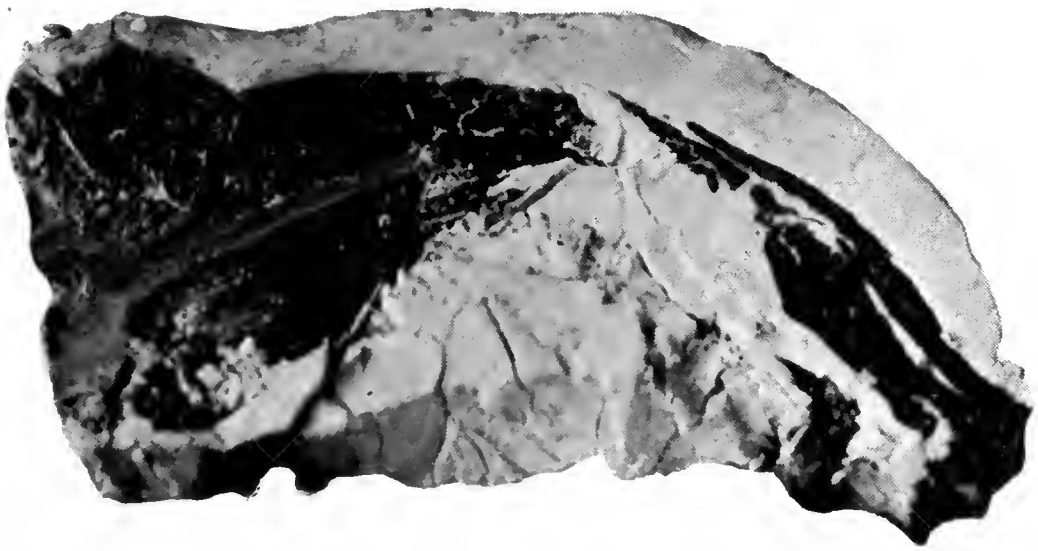


HIP-BONE PORTERHOUSE STEAK. LOIN CUT NO. 8

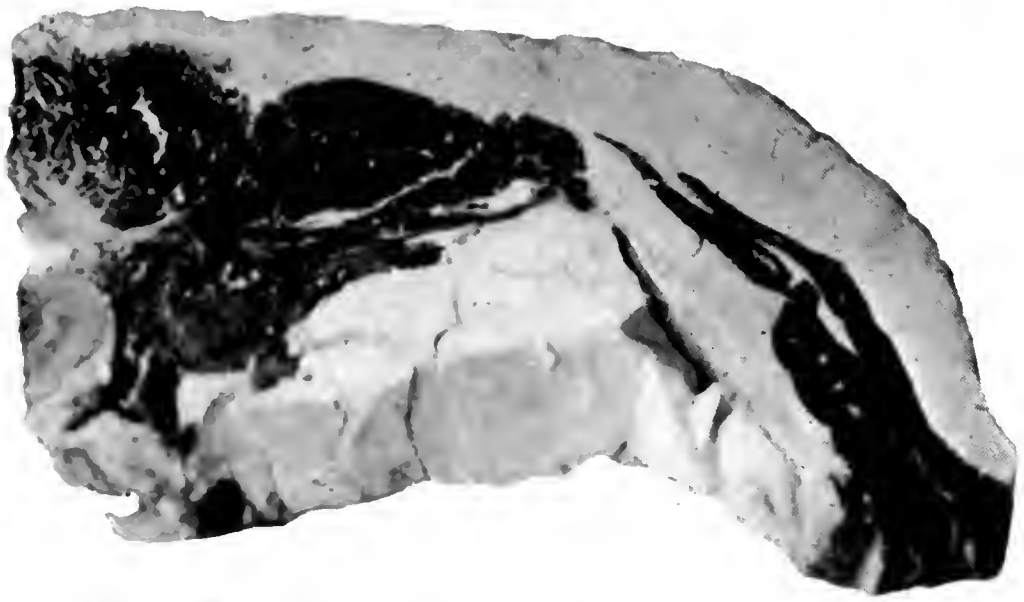
REGULAR PORTERHOUSE STEAK. LOIN CUT NO. 9



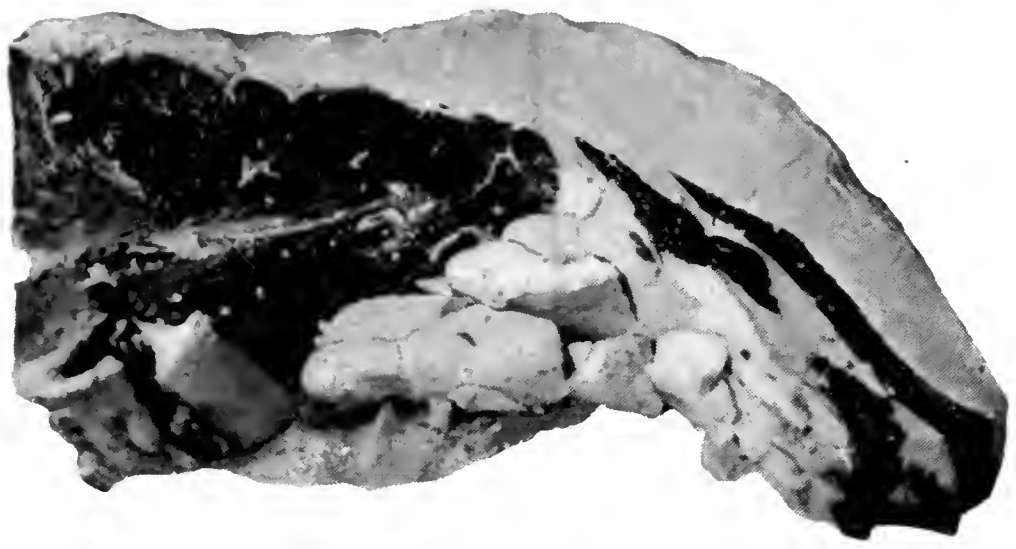
REGULAR PORTERHOUSE STEAK. LOIN CUT NO. 10



REGULAR PORTERHOUSE STEAK. LOIN CUT NO. 12

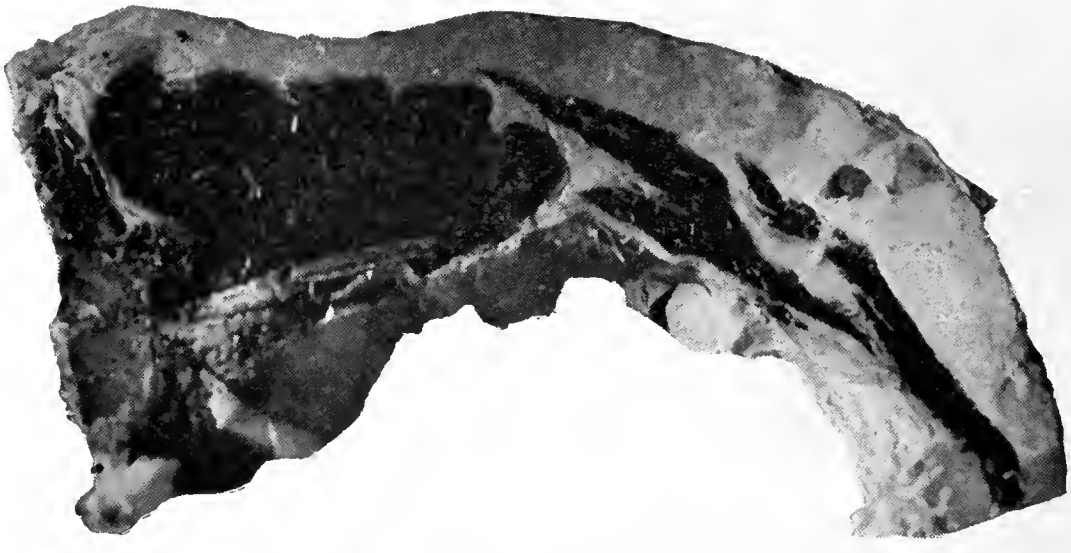


REGULAR PORTERHOUSE STEAK. LOIN CUT NO. 13

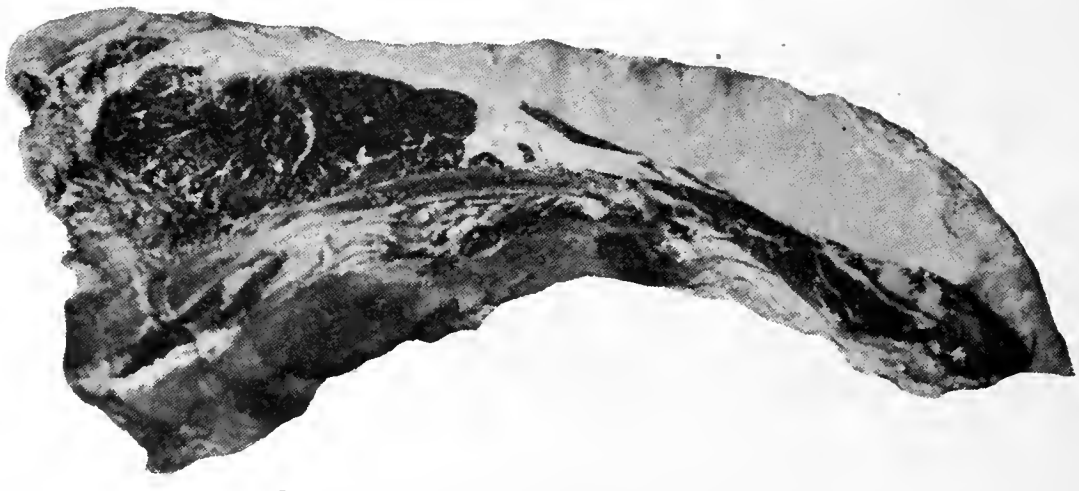


REGULAR PORTERHOUSE STEAK. LOIN CUT NO. 14

REGULAR PORTERHOUSE STEAK. LOIN CUT NO. 15



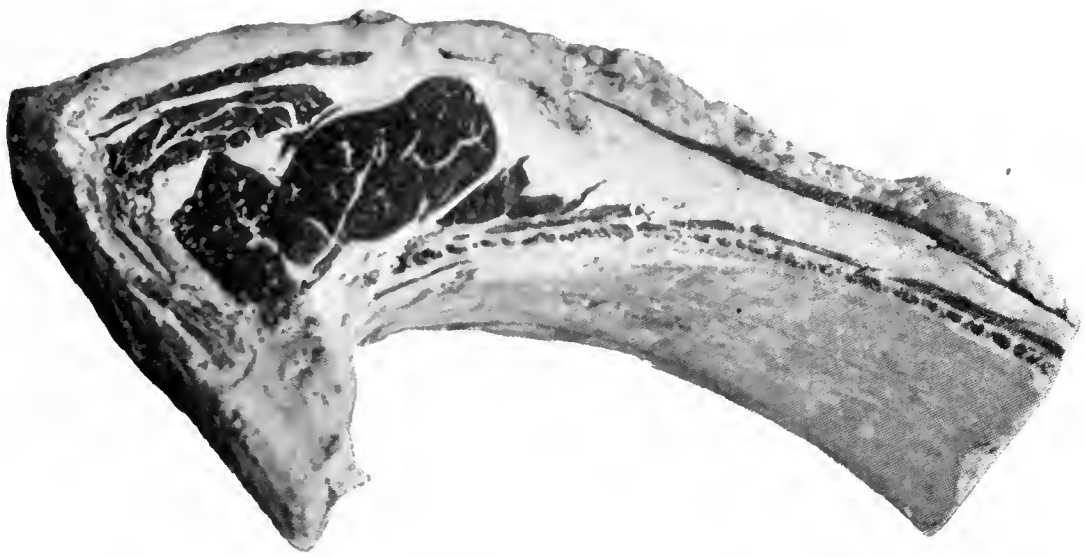
CLUB STEAK. LOIN CUT NO. 16



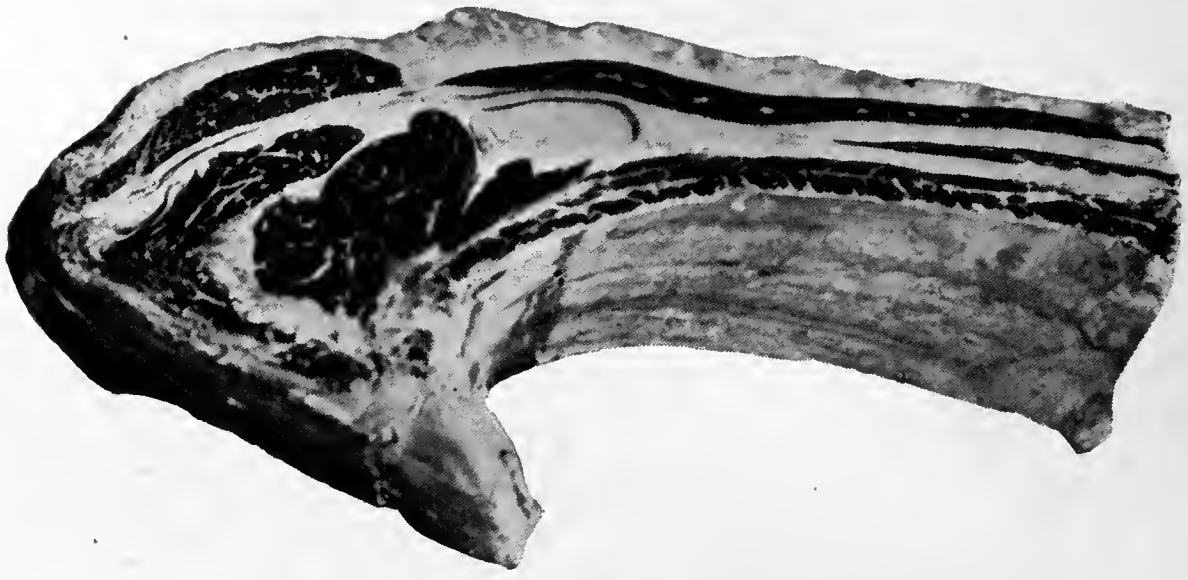
CLUB STEAK. LOIN CUT NO. 17

CLUB STEAK. LOIN CUT NO. 18

ELEVENTH AND TWELFTH RIB ROAST. RIB CUT NO. 1



NINTH AND TENTH RIB ROAST. RIB CUT NO. 2

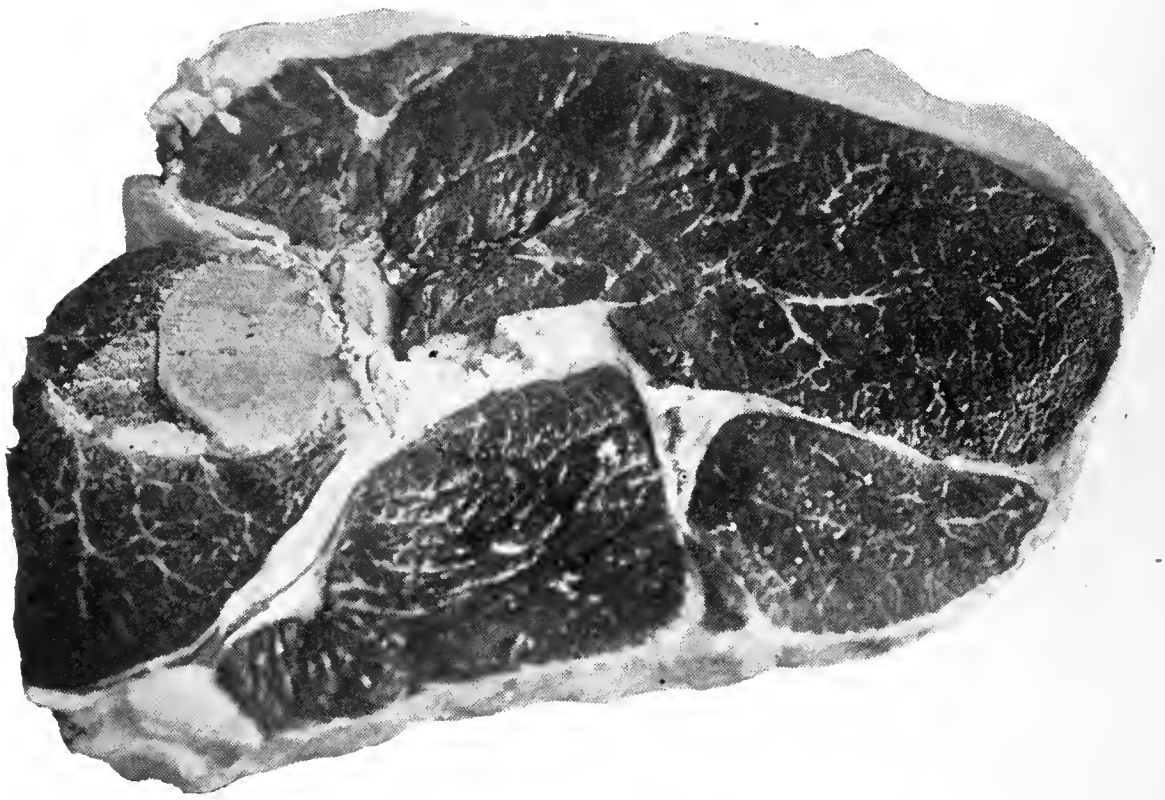


SEVENTH AND EIGHTH RIB ROAST. RIB CUT NO. 3

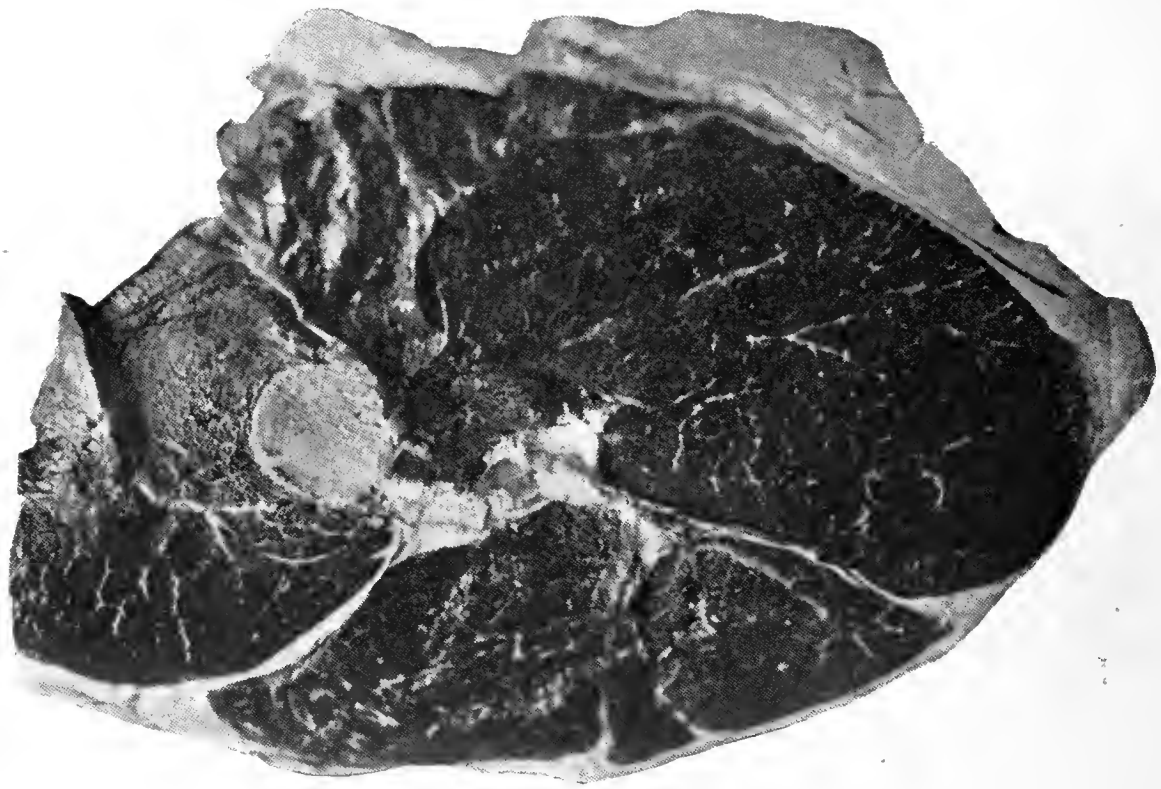
SIXTH RIB ROAST. RIB CUT NO. 4

RUMP ROAST. ROUND CUT NO. 1

ROUND STEAK. ROUND CUT NO. 2



ROUND STEAK. ROUND CUT NO. 3



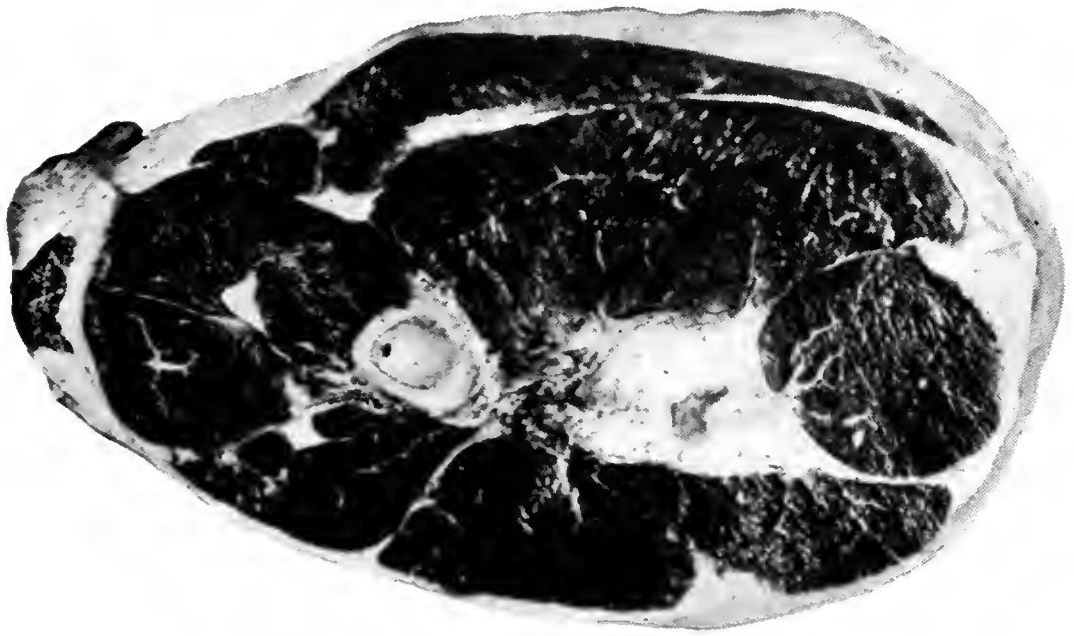
ROUND STEAK. ROUND CUT NO. 4

ROUND STEAK. ROUND CUT NO. 5

ROUND STEAK. ROUND CUT NO. 6

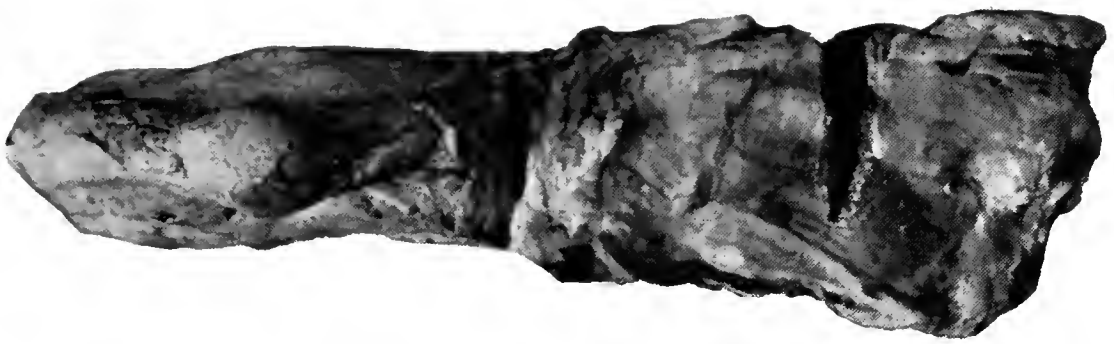
ROUND STEAK. ROUND CUT NO. 7

ROUND STEAK. ROUND CUT NO. 8



ROUND STEAK. ROUND CUT NO. 12

ROUND STEAK. ROUND CUT NO. 14



HIND-SHANK SOUP BONE. ROUND CUTS NOS. 17, 18, 19

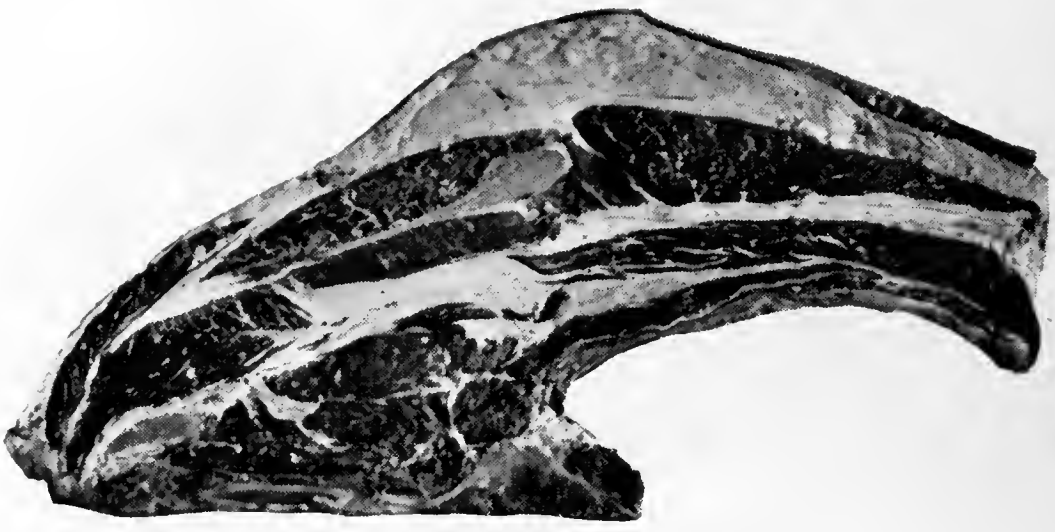
ROUND POT ROAST. ROUND CUT NO. 16

KNUCKLE SOUP BONE. ROUND CUT NO. 15

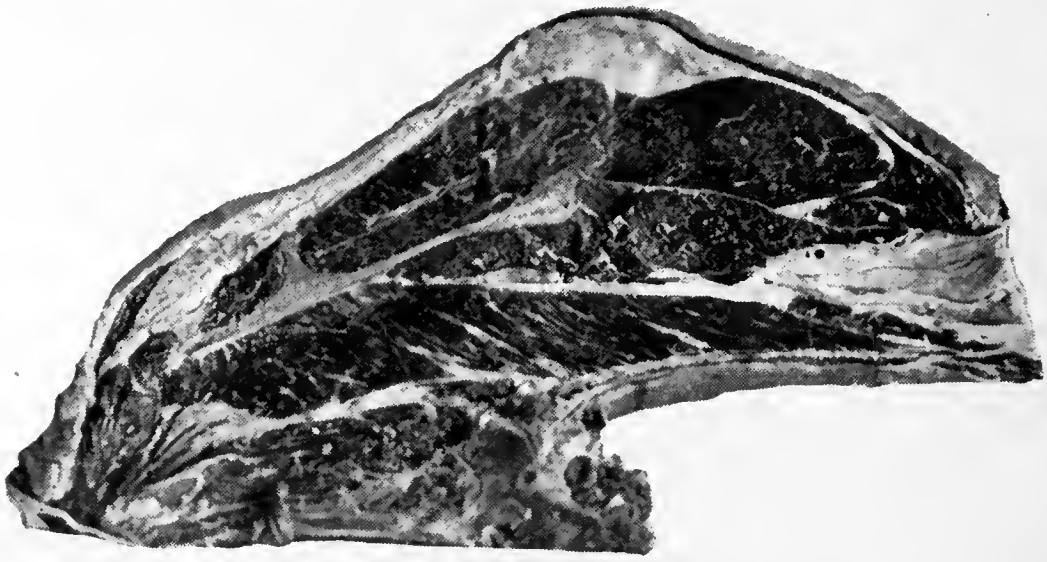
CHUCK RIB ROAST. CHUCK CUT NO. 1

CHUCK STEAK. CHUCK CUT NO. 2

CHUCK STEAK. CHUCK CUT NO. 3

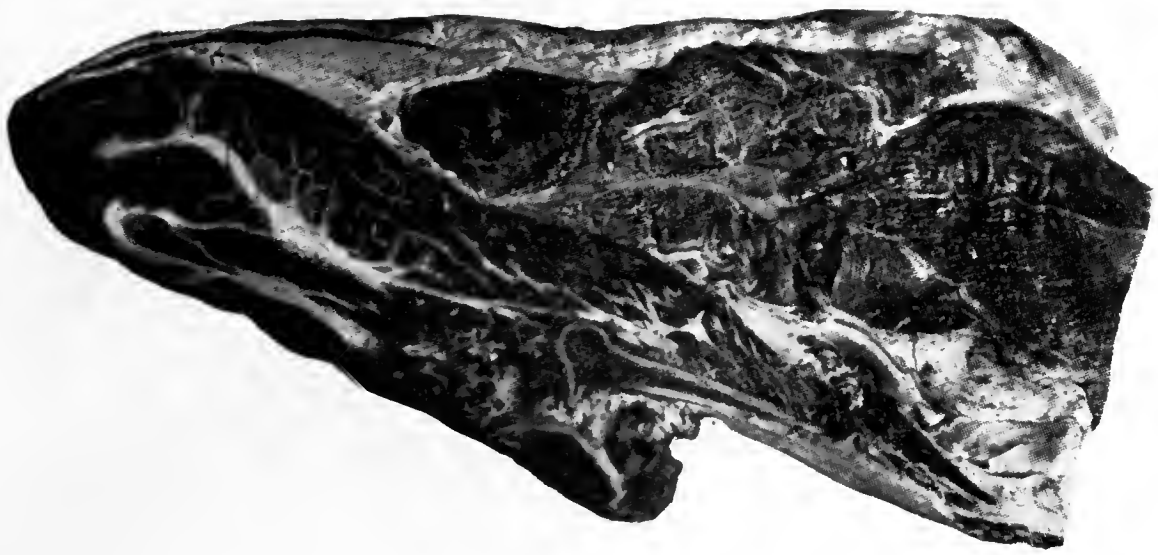


CHUCK STEAK. CHUCK CUT NO. 4



CHUCK STEAK. CHUCK CUT NO. 5

CHUCK STEAK. CHUCK CUT NO. 6



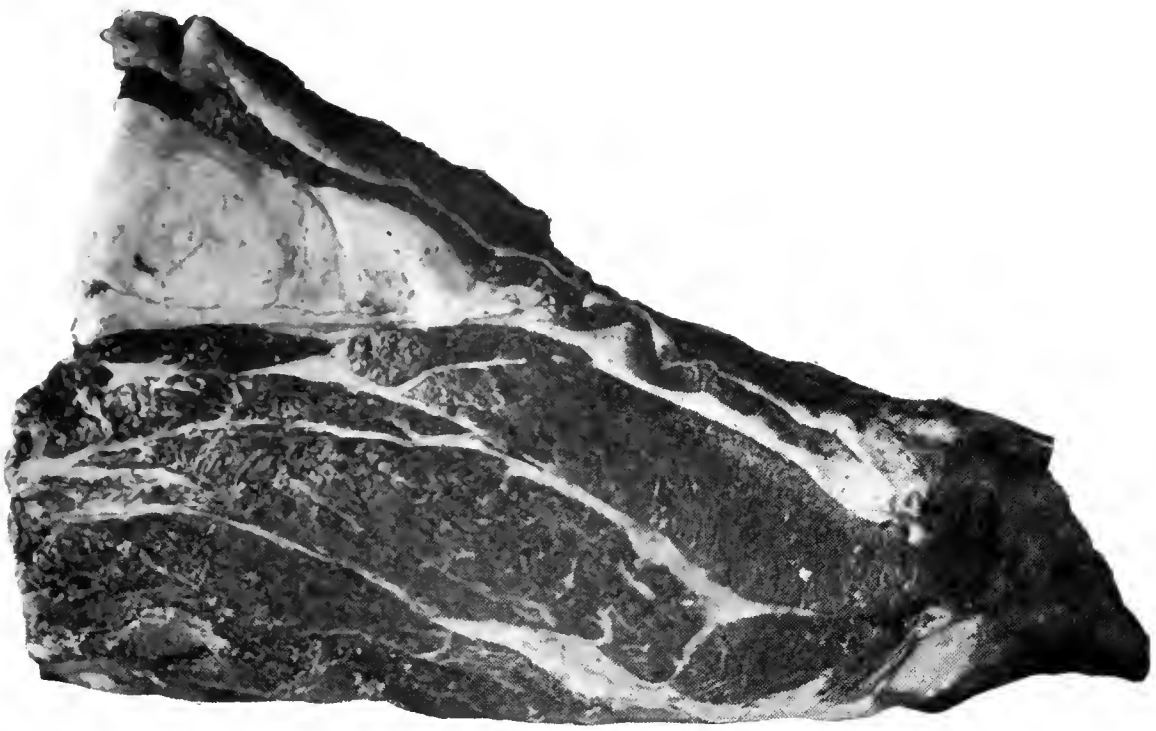
CHUCK STEAK. CHUCK CUT NO. 7

CHUCK STEAK. CHUCK CUT NO. 8

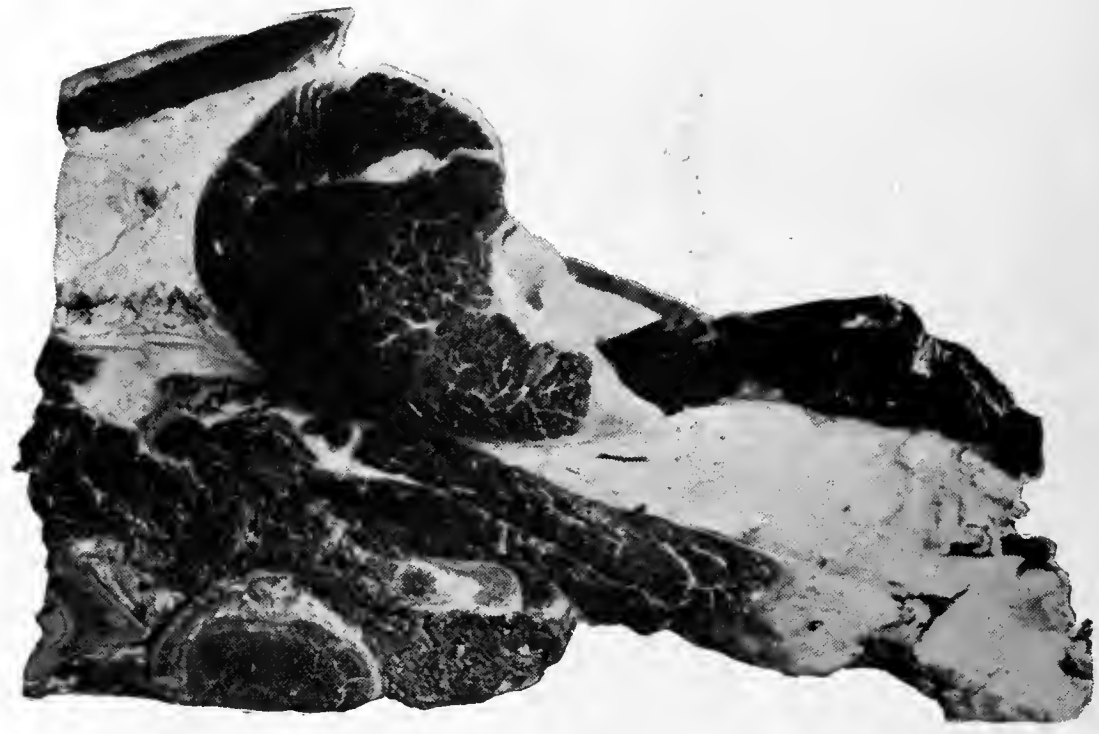
CHUCK STEAK. CHUCK CUT NO. 9

SHOULDER POT ROAST. CHUCK CUT NO. 10

SHOULDER POT ROAST. CHUCK CUT NO. 11

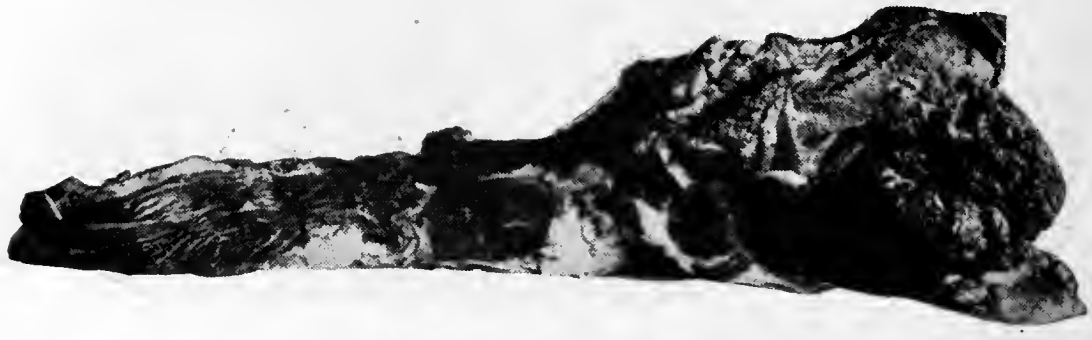


SHOULDER POT ROAST. CHUCK CUT NO. 12

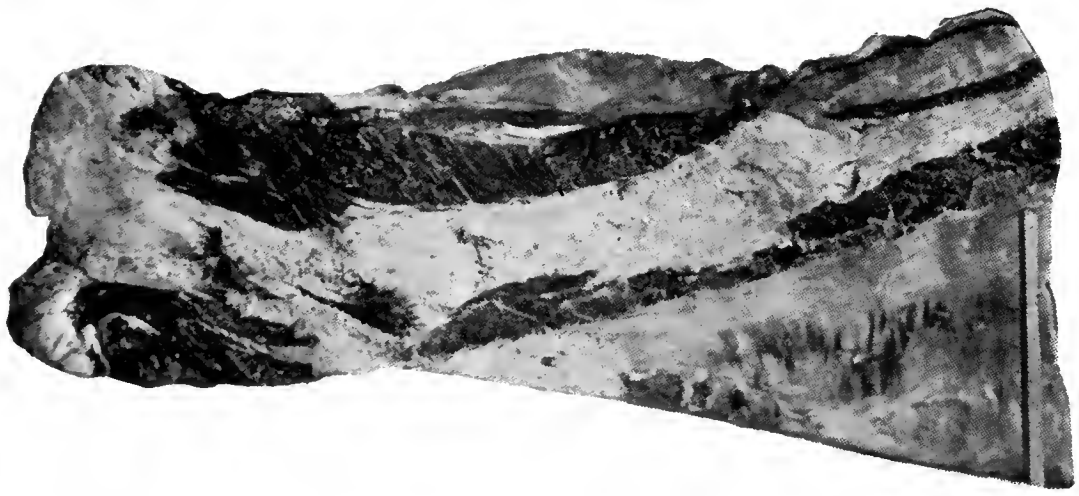


CHUCK STEW. CHUCK CUT NO. 13.

SHOULDER CLOD. CHUCK CUT NO. 14



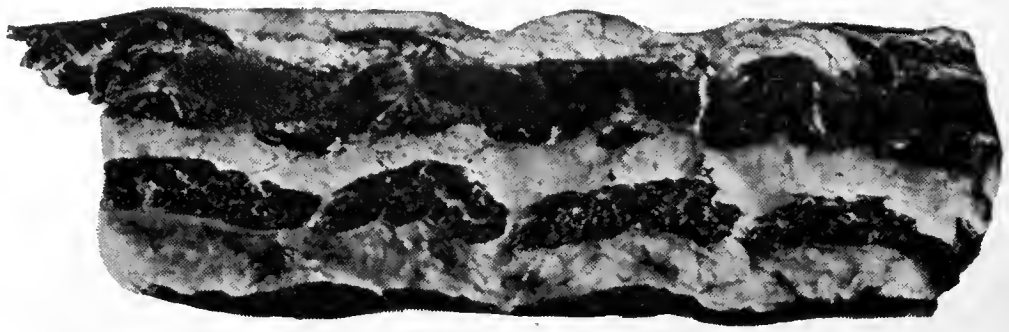
NECK. CHUCK CUT NO. 15



BRISKET. PLATE CUT NO. 1

NAVEL. PLATE CUT NO. 2

RIB ENDS. PLATE CUT NO. 3



Rib Ends. Plate Cut No. 4

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Flank Steak. Flank Cut No. 2

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KNUCKLE SOUP BONES. FORE-SHANK CUTS NOS. 2, 3

FORE-SHANK SOUP BONES. FORE-SHANK CUTS NOS. 4, 5, 6

INDEX

ANNOUNCEMENTS

PURE FOODS

THEIR ADULTERATION, NUTRITIVE VALUE, AND COST

By JOHN C. OLSEN, Professor of Analytical Chemistry, Polytechnic Institute of Brooklyn, N.Y., Editor of *Van Nostrand's Chemical Annual*, etc.

12mo, cloth, 210 pages, illustrated, 80 cents

"Pure Foods: their Adulteration, Nutritive Value, and Cost" aims to present, in language easily understood, the results of the large amount of scientific investigation to which the various phases of the food problems have been subjected in recent years.

The text includes the chemical composition of each class of foods, the methods used in producing the food, and the common adulterations, together with a number of simple tests for the detection of these. The directions are so explicit that they may be carried out by persons who have not been trained as chemists.

The nutritive value of foods being given, it is shown how the true cost may be estimated.

There is a statement of legal requirements for pure foods, and a list of references to literature on the subject so that those interested may pursue it still further.

This volume is admirably adapted for use in domestic science or chemistry classes where the chemistry of foods is studied and laboratory tests made for purity. It will also furnish excellent supplementary reading in the upper grammar grades.

The intelligent consumer of foods and the food producer or dealer will find this of great assistance in purchasing pure and nutritive foods.

165½

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BACTERIA, YEASTS, AND MOLDS IN THE HOME

By H. W. CONN

Professor of Biology in Wesleyan University. 12mo, cloth, 293 pages, illustrated

THE book contains an important summary of the facts which have rapidly accumulated in recent years concerning the relation of microörganisms to all matters connected with the home. The work is a popular and not a scientific discussion, free from many technical terms, and admirably adapted to the needs of the housewife, the student of domestic science, and all others interested in home economics.

Molds, which are the cause of mildew, the spoiling of many foods, and the decay of fruits; yeasts, which are the foundation of fermentation in the raising of bread; and bacteria, which cause food to spoil, meat to decay, and contagious diseases to spread, — all these phenomena which are of the most vital importance are presented in an interesting and helpful manner. The author explains the various actions of bacteria, and points out the sources of trouble and the principles which underlie the methods to be adopted for avoiding their effects. Special attention is paid to the problems of food preservation and to the practical methods which can be used in the home for preventing the distribution of contagious diseases.

To render the work more useful for classes in domestic science there is added an appendix containing directions for a series of simple experiments which will give to the student a practical knowledge of the most important properties of microörganisms.

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By LEWIS B. ALLYN, State Normal School, Westfield, Mass.

12mo, cloth, 127 pages, illustrated, 60 cents

THIS book offers practical applications of chemistry to present-day civic and industrial problems. The course is essentially that conducted by the author in the Westfield State Normal School, where a pure-food campaign has been made one of the objects of the course. The widespread results shown in the almost complete elimination of the sale of impure foods in the city of Westfield are matters of national knowledge.

Besides the work with food products, the book includes exercises with water, textile fabrics, drugs, soils, and similar materials. It gives a particularly complete analysis of each subject and brings out clearly the practical relation which chemistry bears to everyday matters. The order of presentation differs radically from that of the usual textbook in chemistry, the common elements, bases, and radicals being taken up as they naturally occur.

For supplementary use with any regular textbook "Elementary Applied Chemistry" is invaluable. Teachers of domestic science will find the chapter on food values most important, while for boards of health, inspectors of milk, and all those interested in the pure-food problem, the book has a special function in its valuable information and tests relating to their work.

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